Argus700 Sĕries 2.

... O PER APPEART LEGINALA D' TAQI

FERRANTI Computer Systems

NEWS IN BRIEF

Wider use of networks

PROFESSOR Michael Beesley has presented this report, on the economic insplications of liberalising the tise of British Telecom's transmission networks, to the Department of Industry. A Dol spokesman said that people in the Department would now look at the report and take action where necessary, including on whether to publish any

Professor Beesley is to speak at Infotech's conference on public data networks in London from March 9 to 11.

New Sunday paper

PLANS by the owners of the Daily Mail to start a new Sunday newspaper could give new tech-nology in Fleet Street a major boost. Although the proposal by tative, managors there are convinced that a new publication would not be started using old technology, and are envisaging editorial and printing work beong carried on in different buildings, coonected by communications

Takeover bid fails

A SHARE swap takcover bid by Data General for graphics display manufacturer Megatek, originally valuing the San Diego company at \$17 million, has been rejected. But Megatek has denied that its reason was the fall in the value of Dats Geoeral shares.

NY fire was arson

THE fire at the Stouffer's Inn hotel in surburban New York from which several IBM executives escaped late last year has been de-clared o case of arson by officials of Westchester County. The fire killed 13 executives of Arrow Electronies, the biggest compo-

Tran brings down Amdahl profits

ended December 26, has been reported by Amdahl in a set of results for the year that ahow turnover up by 23% to \$394 million compared with 1979. The figures for both years published by Amdahl include the results of Tran, the data communications manufac-turer acquired by Anidahl in July 1980. According to Amdahl, Tran was making a

positive profit contribution by the fourth quarter of 1980 compared with losses that

PRESSURE on the Home Office tioo that data protection legislation was now "vital" for the UK "to

to take action oo data protection bas now reached such a level that the Department is expected finally

To the OK "to remain competitive in international business."

He added, however, that the

to break its long silence on the legislative calendar was so crowded subject and make its inteotions that it was unlikely an Act could be

Several MPs and even a senior is tabling Parliamentary questions to the Home Secretary about the

Protection Authority.

Roy Croft, deputy secretary at the Department of Industry, told ing of the coovention by seven countries, indicating their intention to ratify it in their Parliaments

civil servant from the Department

of Industry are now calling for legislation, and the British Computer Society has formally offered

to operate a data user registration scheme in the absence of a Data

AMERICAN-STYLE selling is coming to the UK with Computer

Associates' Express Software veo-ture. The new marketing opera-tion, based on telephone selling

and direct mailing, is part of a major new sales drive lo Europe

the 2900 family with the 2977, a system that offers 12% more

power than the existing 2976 and 50% more than the 2966 launched late last year.

to record a \$1.3 million loss in the 1979 fourth

profit figure down \$200,000 to \$15.2 millium, suggesting that Tran continued to make 1980 turnover figures for Tran were made available by Amdahl but Trnn'a own resulta for 1979 ahowed a turnover of about \$22 mil-

Bosed at Marina del Rey, Colifornia, Tran builds the M3200 integrated digital network aystem which can carry vuice, facsbuile and lmage information as well as data. It can be used in an IBM Systems Network Architec

ture environment.
Another hig development for Annlahl in 1980 was the Navember hunch of the 580 series, its respunse to the 111M 3081. At the same time, purchase prices un the existing 470 mochines were cut hy 17%,

was to have carried.

The moin objection to the mag-

netic stripe was that it was nut naked-eye-readable, and could

therefore contoin information of

which the bearer was not aware. In

consequence it was suggested that

the printed information on the

card should be in OCRB funt sn it

could be mochine-read by optical scanning, but even this idea was opposed by the National Commit-

tee for Informatics and Liberty, and consequently dropped. The

card is nut in thenry ob-

ligatory for elilzens tu carry, hut o

new law requiring some means of identification has just been passed.

to operate an organisation to issue

ficences to organisations wishing to hold liles of personal data, and to register individuals win keep such

files. Overseeing the protessional

involved, according to the BCS Privacy Committee's plans.

The BCS is offering its services

Burroughs brings an outside

end-of-year Tax ior now available from

WEST MIDLANDS BY 2 706

FINANCIALLY troubled to roughs is taking advanted of new early retirement promote to replace its existing entering vice-president of engineers at monufacturing operations. Let Call. The new man is Probable. act os a surrogate passport, cna-bling quick checking uf trovellers at border crossings. A new plastic card with elaborate guards against forgery less been pruduced, but without the magnetic stripe that it an outsider who was fone president of commercial fina-ics operations at Rockwell in a

tional.
Cali is expected to rea March of the age of 58 to roughs has been reported a cribing his departure a "his amicable". Call spparent for early retirement some inca At the same time the set severely critical of the man

The appointment of Pal that creditors will receive between of bringing new blood in 7p and 15p in the pound. The creditors include Trust House Forte, Grand Metropolitan Hotels and a number of lecturers, some of Icrome Jacobson, as vice p whom are owed several thousand Chairman Clive Wilkins, who bas been with the company since its early days in 1970, blames the recession and the fact that many

normal practice to ill me the company from within. Burroughs has reported by nearly \$69 million for it. than \$82 million, more structure of the processing and laying down stundards would be million down on the 19 figure. The loss related to million wirite-off of observe

Micro New

Systems and

disc through carridge to Winchester alcrate. Govt ducks MP's

INFOTECH LTD, the Maidenhead-based training, publishing and conference company, went into voluntary liquidation on Fri-

£39 per month inc. maint.

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is in the breaking up of several remarkable teams of people. It is mitigated, bowever, by the fact that they will readily find dsy. As a result 113 people have lost their jobs,
Its debts are between £700,000
sad £1 million and estimates are ecceptance on the open market."

Sources within the company say that the speed of the crash came sa a surprise. Wilkins acknowledges that an incresse in European busi-ness, to offset a decline in the UK, has happened too late to make any

Number 744

CONFERENCE FIRM FAILS WITH DEBTS OF

Infotech goes

into liquidation

OVER £700,000 AND 113 OUT OF JOBS

Legal action

The demise of Infotech, the largest company of its kind in Europe, will leave a void in the training market. Companies like Commercial Unioo, SAS, Swissair and Den Danske Bank stand to lose considerable sums that have been paid for advance bookings. Texas Instruments could lose well The company liss been expand-ing at an annual rate of 50% since over £10,000.

hs bresking up

£90,000 for advanced bookings until the end of 1981. A boardroom split at the end of A boardroom split at the end of the summer saw three directors leave to form Xephon Technology. Roy Goodman, the founder, used his major shareholding to assert himself on the board and, in the spring, appointed himself chairman and managing director. The dispute was patched up with Goodman having two-fifths of the voting rights and Wilkins plus fellow directors John Blake and Chris Boon splitting the remainder Unions plan to halt govt computers

Turn to page 16

Boon splitting the remainder

There were problems early in 1980 with legal action over the copyright of lectures belonging to a major contractor, Keith Jackson,

now of CMS. He was recently paid £15,000 of a total £30,000 which

was agreed to he owing. "His decision to claim the money sped up the closure," says Wilkins.

Jackson is claiming a further



in pay deadlock

INDUSTRIAL action to halt gov-

certainty," say trade unionists fighting for an increased pay offer for civil servants. This follows a deadlocked meeting with Ministers Lord Soames and Barney Hauhoe.

Mass meetings are being held this week for consultation before a final decision on action is taken on

February 26.
At the 134-hour, meeting on Monday, the Ministers stated

there was no question of a settle-

ment this year based oo compari-

cause of the government's determi-nation to stick to cash limits. Government plans to draft in

other staff to run computers were condemned by Tony Christopher,

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Thursday, February 12, 1981

Memorex **\$29m loss**

Briefing

livered its expected loss for the year and for the final quarter of 1980. The loss for last quarter was \$3.2 million and the loss for the year as a whole was \$29 million.

Turnover of Memorex grew by \$31 million, from \$737 million in 1979 to \$768 million in 1980. Chairman C. W. Spangle said the fourth quarter was the second consecutive Improvement per

First in Europe

high speed laser printer on a trial basis for a year, service bureau Scao Laser Printing has bought the machine and ordered a second for shipment next month. Located at Scan Laser centres at London and Slough they will be the first two 9700 installations in Europe.

WP institute

PROFESSIONAL Institute for word processor operators is being set up by a group of WP aupervisors, managers and consultants to "promote and uphold professional standards." The Institute of Word Processing has opened an office in London and is drawing up plans

NAS move

FOLLOWING the lounch by IBM of the 3081 which roughly matches the performance of the single processor Hitachi M200H, Notional Advanced Systems is to sell the dual species M200H in sell the dual processor M200H in IBM compatible form as the AS/9000 DPC. The single proces-sor M200H is already sold by NAS, BASF and Olivetti Compu-

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At the same time, the company has announced the availability on the 2955, the other new 2900 launched last Novomber, of VME/B-B, the stripped-down "simple us use, quick to install" version of VME/B.

He added, however, that the

that it was unlikely an Act could be

government's intentions regarding the Council of Europe's conven-tion on data protection. Smith is a

representative to the Council and

was present last week at the sign-

aimed at Computer Associates' traditional IBM market.

According to Harry Gordon, CA's new UK managing director, Express software will sell products

in the systems performance and program development field,

"typically under £2,000". "We're

Telephone selling in IBM market

passed in this sess

Differences between the 2977 and the 2976 include a 16K-byte cache store, restricted so far to the top end 2982, 1024 current page registers compared with only 16 on the 2976, and an address transla-tion unit that operates simultaneously with the rest of the logic to schieve faster throughput.

ICL says that the air-cooled 2977 is aimed at the same market segment as the 3033S, the bottom end machine in the IBM 3033 family. It quotes £1.2 million for a 2027 2977 configuration with a six-me-

4341 - K01

because it employs the Store Control Unit and Device Control Unit and Device Control Unit used with the smaller 2900s rather than the Store Access Cootrol Units and Store Multiple Access Control units common to all the CSS machines.

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May 3033 - M12 and M16 Aoril Plus supporting peripherals

Top-end extension to ICL 2900s

The countries that have signed so far are Denmark, West Ger-

many, Sweden, France, Luxembourg, Austria, and Turkey. A country is not allowed to sign un-

less it has domestic legislation on

data protection; other nations that

have indicated their intention to

legislate and then sign are the Ne-therlands, Belgium, Italy, ond

The UK government agreed to the draft coovention in October,

but has taken no further action.
Also on the international front,

privacy pressures in France have forced the government there to drop plans for a machine-readable personal identity card that was to

volume operation," he comments. CA claims to have instelled over

10,000 products in 50 countries -

at the rate of 300 monthly - and

expects this year's sales to double its turnover to \$20 million, includ-ing £1 million from the UK.

adding the fast multiply and divide unit to the Order Code Processor.

The 2977 OCP is based on the original 2980 OCP, like the OCPs in the 2976 and 2982, and the new machine slots into the Common Storage System range of 2900s that can be enhanced from the 2960 right up to the 2982,

The 2966 is the one exception

For DMB users moving over to VME, the 2977 can be run with a 2960 using the attached emulation facility. The 2977, like the other big 2500s, is not a migrocoded machine and therefore decided gabyte main memory and 5,200 michine and therefore does not megabytes on disc.

Main memory can be expanded to a maximum of 16 megabytes and options include the Distriction of the 2960, that enables DMR and processing cart also be boosted by gether;

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m OPH}$



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Led Sub-Saided by CPC Shorteral Date Primes Primes (1988)
Clickward, Subran, Statem Said 1882

IBM 'growth' is no growth

expected orders had not

He ssys: "We were geared up for growth and, it was difficult to

THE IBM annual report, due for release in about ten days' time, ost shareholders nearly one-third

Adjusting for inflation using the 1980 dollar as a constant, the IBM share was worth \$67.88 on December 31, 1980. On the same 1979; \$94.26 in 1978 and \$101. I in

question on aid to ICL

government has refused to strengthen the company,"
hy assurance that it will res. He went on: "My depart
the should the company's in consultation with ICL.

tually a fall on the previous figures of \$78 million, from \$2,551 million to \$2,479 million, adjusted for inf-

The volume of machines and pasts on rental leaped by from \$1,610 million in 1978 ro \$15,352

two years.

Working capital at IBM fell from \$4,406 million to \$3,399 miltioo over the year.

He went on: My department is in consultation with ICL over its

1976, \$94.26 in 1978 and \$101. I in Borrowings over the past two years were \$2,000 million and the company still has uoused credit lines of \$2,875 million. According to the company there is a require-

ment for significant investment in the years shead. This comment is borrowings in 1981.

to 341,729 from 337,119 in 1979.

There was a big jump in earnings in the Buropean, African and Middle East division, from \$1,082 million in 1979 to \$1,511 million in 1980.

Noting that \$207 million of net earnings were due to year cod tax ehanges in the US; the report said that the company expected "the cost of investment to be high with

Software growth

RENTED software is on the in-crease according to a survey by the National Computing Centre. The survey, supported by the Depart-ment of Industry, found that ex-penditure on software in 1981 would be 50% up on the 1979 figure to £74 million.

general secretary of the Inland
Revenus Staff Federation, saying
such action could make working
together after the dispute very difficult.

He was also afraid that threepossible elements of his union
could be provoked into sabotaging
the computers, which would lead

INSIDE THIS WEEK'S CW . . .

problems set worse.

Replying to questions on Monday from MPs on both sides of the House of Commons about whether the would sustantee the future of the company, Information Technology Minister Kennetti Baker replied only that he "had had no forms request for side."

Lory MP Hugh Dykes asked it the government will bring ICL back under the wing of the National Enterprise Board, as some reports have suggested.

A group of MPs including Robert Cant (Lab, Stoke on Trent) have written to Industry Secretary Sir Keith Joseph about ICL, saying, "The time for intervention is now," and asserting it would be "a tragedy if ICL were relegated to the status of a third-rate company."

The firm's problems may soon become "insuperable" they side.

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10B OPPORTUNITIES: Pages 26-4

money is svailable. Operation of accounting system is still being blacked, however. System Industries

In the separate dispute over pay

for health service computer staff, a halt has been called to one-day selective strikes while investiga-tions are carried out on how much

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Construction of the state of th ter and subsequent decoding at the reserver.

If you improse a second receiver, nor part of the system, also defocus the carrier and the rone-burst or other modulation corresponding to the water level indication. If this second receiver has no pre-knowledge of the significance of this signal, then it cannot be said that effective information (knowledge) has been conveyed.

The creation of information in thus inseparably bound up with the significance attributed to that information.

COMPUTERVIEW

LETTERS to the EDITOR

control system. One such interfsce

is the input of water, such as rainfall and inflow from rivers.

Water levol may therefore be in-

terpreted as a transformation of rainfall information, in the same

way as a rain-gauge is used to ladicate and measure rainfall. So where is information created? In the

condonsation process in the

The problem seems to boil down to the use of words. What informa-

tion are we considering, rainfall or water-level? If the latter, then creation of the information is at the

level-sensors; if the former, it can be argued that ereation is in the

clouds, or the meteorological

The question might seem to be rather pointless, but if it must be pursued, then the rules for deter-

mining creation of information

must include a statement of what

information we are talking about and a determination of where that psrticular information arises in the

In these terms; the defined in-

formation can be created in a com-puter or in any other device. But

we can attribute creation only if we

define what information and its form (representation) we are coo-

sidering. If, on the other hand, we wish to trace the source of information back through all its manaformations in the Universe, then we have an impossible task and in this case I would say the question is pointless!

Dota Processing Services

1984 and all that . . .

CONTRIBUTIONS from readers are welcome for our column of the strange things people say in the media about computers. We will pay £5 for each item we publish.

A tarritying prospect of a world relat or antinved by the magnetic band has been conjured up in Month Carlo during the first international symposium devoted to computer accurity.

One marriagle of the type of blackmail that sould be achieved carne from west Germany, where an operation of a large chemical group. The population over \$200,000 ransom to the prover the bailets, writhout which the company could not operate.

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Dota Processing Services

puts the market value at a slightly lower \$3 billion at the end of the decade. These similar opinions from two of the major entrants in the market both reflect the degree of importance that should be given to speech synthesis over the next few years - or do

Media reports have spoken convincingly of the virtue in making all sorts of machines repeat the same phrases time after time. But how many of us would really like to hear "Have you fastened your seat belt", every nime we enter our cars, or "The time is 7.30, your tea is ready" whenever we wake in the

In fact, the onthusiasm given to speech synthesis by US and Japanese companies could be interpreted purely as a race for seiectific achievement. It is always satisfying to a scientist or engineer to achieve the so-called "impossible" regardless of its practicality.

The current stage of development reached by US companies certainly fosters this impression. National Semiconductor recently gave a presentation incorporating demon-

point of view into the debate be-tween Alan Suteliffo and Donald

Let us first try this definition of

All eotities intoract with their

eovironment, actively or passively. This interaction is achieved by

transfor of information across the

interfaces between the entity and

Thus, a hot body communicates by emission (radiation) of heat

nergy. This energy mey therefore

be regarded as constituting in-formation. The knowledge thus transmitted in this rudimontary case is the existence of the hot

Equally, the transmission may take the form of light waves or

other electromagnetic radiation. A radio receiver having a DC meter

in Ita detector eircuit can detor-

mine the existence of a remote radio transmitter, by reception and indication of its earrier. This in-

formation (on "existence") may it-self be "news" and so satisfy one

accepted eritorion for "informa-

If, bowever, the carrier be mod-ulated in a manner which has sig-

nificance ("meaning") to the re-ceiving body, the information content of the transmission is

body does not require to possess that which we term "intelligence" for the receipt of the information

to be effective. For oxample, a eval detector at a water reservoir

might cause a signal to be sent to a

remote control valve, which is opened if the water level fulls below a predetermined value.

Has information been created in this very simple case?

Firstly, information on water level is conveyed to the level-sensor device. If the information is created at all, it must be at this interface. Thereafter, it is merely a matter of encoding at the trainaultiter and subsequent decoding as the receiver.

Please note that the receiving

profoundly enhanced.

what we mean by "information"

Michie? (CW, January 8).

The creation

of information

IN less than ten years, the world market for speech synthesia could reach \$4 billion, says National Semiconductor. This figure has been selected by Tayes Instruments which

Survey of operators' salaries

Paul Fisher's article (CW, Jao-

uary 22) It la important that tho

partinent facts are revoaled when

his article be gives prevalance to

o particular survey which is based on the result of enquiries in 132 companies. The Computer Us-

ers' Year Book salory survey is

mentioned, but the fact that the

survey eovored operators in 1,433 computor installations is not

reveoled, nor is there any meetion made that the CUYB

analysis comprised 3,015 operators and 1,417 sonlor

Although bigger does not

necessarily mean better, it seems to mo that your readers would be

better sorved if the portinont facts were revealed so that they could judge the credibility and value of a particular survey.

ROBERT GRANT

Editorial director Computer Users' Year Book Bournemouth

CAN any of your readers help me

in my search for the book The Great Computer, by Alaf Johannesson, originally published by Goliancz in 1968?

This book is out of print but if anybody has a copy which they would be willing to let me have I should be truly grateful.

STEVE SHIRLEY (Mrs)

Search for

salary surveys are compared. In

strations slong the lines previously mentioned: a speaking tea machine, car and doll; and speaking gsmes and scientific equipment. Texas Intruments has incorporated speech imo its personal computer, the 99/4, and other educational toys and games such as Speak and Spell.

With a little more thought, the true potential of speech synthesis can be realised. Companies concentrating on its deelopment are unfortunately not in a position to demonstrate this potential

Awareness of and enthusiasm for speech synthesis will not emerge to any great extent until interfaces and applications have been developed to go with it.

At the moment the use of speech to attract attention gives no more information than other indicators such as buzzers and flashing lights. It is to this area that greater thought must be directed, and there is no reason why the incorporation of apeech within a product should not greatly enhance the information output.

The simple car example of "Have you checked your oil" could, with the addition

of sensing circuitry, be modified to say "Your oil level is low, add two pints" or "The fuel will last monther 10 miles at your present speed".

Many uther applications exist and National Semiconductor has named but a few. Pire alarm systems in bulldlings could incorporate speech to say exactly where the is, which stairs or lifts to use and which not, ur even give directions to assist people's exit from the building.

Speech has numerous applications in telecommis. For example, when a caller tries to reach a person at a number, the telephone could speak a message stating where that person could be contacted, or when the person was likely to return to the nriginal

Speaking machines are, of course, invaluable to the blind end could help them to participate in activities which at the moment are not available to them. With the aid of a same level of development as the US me voice, blind people could learn how to operate equipment. Their mistakes could be verbally communicated. On a more domestic level, a speaking clock could certoinly

Other applications exist in t wint areas; supermarket check-out system is tory production lines, data loggest the medical diagnostics world, and is prevention of accidents.

However, there is another reason for the derelopment of speech synthesis - speech

Speech recognition in practice ne comparing a spoken word or phrase to be stored in memory and choosing the maintain in order to make the corner is pouse. The complexity of the system to quired depends on the size of the me The Japanese are fast developing

synthesis and recognition to assist in the word processing. A keyboard is through physical impossibility for the lines alphabet, as it involves thousands of the tera. The incorporation of speech re-nition eliminstes the need for a keybond

With o need as important as the, a Japanese almost certainly have reached panies, and have probably got fute National Semiconductor expects to land veloped a speech recognition model 1983.

Yet another

CONCERNING Mr Atherton's article (CW, January 22), is it fuir tn introduce yet another set of symbols, and then cull them "conventional"? The prospect is tempting, ond also, especially in education, self-serving. But is it

Is it liable to influence the ecoplo who nutter to the students? don't mean their teachers, but their prospective employers? If so, then it must be a good

tive. The idea can be god must be practical. Computing Department North Staffordshire Polyteds

THE EDITOR Welcomes topins. All letters must be e o o m panied by the writer's name and added

set of symbols

justilied?

idea: but I remain to be convinced. This is not meont to be o "knocking", but a plea to be posi-

tars eom menting ill subjecta published in Com-putar Waskly, or on who not necessarily for public

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New ABS company bids for slice of handprint terminal market

A THIRD contender is now bidding for a share of the "handprint" lems with "sag" in the resistive layers shove that size on the Quest Automation with its Datapad. The firm, CTS Recognition, is owned by small business systems manufacturer ABS Computers.
Formerly called Allied Business

Systems, ABS is owned by the Trafalgar House conglomerato. The CTS torminal, ealled Telepad, employs a uniquo character sensing technique at Salford University under ABS sponsorship. A coil inside the writing pen transmits a low frequeocy sine wave signal that is picked up by an electronic grid under the writing surface. As a character is written the grid generates a stream of X-Y co-ordinates for processing by charscrer recognition software developed at Cranfield Institute of Technology.

Impulses

CTS claims that the uniquo fea-ture of Telepad is being able to detect signals from the pen even if it is writing on a thick pad of documeots rather than on a single form. According to CTS the Telepad could oven be hidden inside or noder the wooden surface of a deak.

The Datapad and more recent Micropad from Quest both employ a pressure aensing techniquo where two electrically resistivo layers under the surface generate impulses under the surface generate impulses when they are squeezed together by the user's pen. CTS managing director John Bendall, who used to sell the Quest product, pointed out that the Tdepad tablet offered the administrators over tablet offered the advantages over the Quest tablet of not suffering

Offering the same benefits over Quest terminals is the Data Tablet from Image Data of Bristol, the third contender in the handprint data entry market. The Data Tablet employs a pen with a msgnetic flux generator, changes in the flux being detected by electronics inside a three millimetre thick tsblet. The technique was developed at Hatfield Polytechnic.

Touch-sensitive

taneous generation of hard appy and much esslor movement from one part of the document to another. Different forms layouts can be hald in the host computer

and new onse sen bo ganarated by the Telapad user.

Telepad and Dsta Tablet can both be supplied with a touch-sen-sitive keyboard for entering non-written charactera and both offer

written characters and both ofter the capability to digitise drawings.

On the marketing side Quest has a big lead over its two competitors, having picked up eustomers all over the world, including the US. Image Data, which launched the Data Tablet just over a year ago, now has distributors in most European countries and also in the European countries and also in the US, according to managing director Jimmy James.
John Beodall said that CTS was

seeking distributors in Western Europe, but was not prepared to tackle the US market yet. Ho hoped that deliveries of Telepad would start in about three mon

manufacturing being handled by the ABS factory at Brighton.

ABS managing director John Risden said that his company had portunities when it decided to back Telepad.

Development was helped by from wear and not being limited to bandling paper of A5 size or smalment of Ioduatry.

Private money line?

BRITISH Telecom could be proval from the Treasury. allowed to borrow from private sources and above its Public Sector Borrowing Requirement limit un-der an amendment to the British elecommunications Bill accepted by the government last week, dur-ing the committee stages of the

Bill's parliamentary progress.
Such borrowing would require consent from the Department of industry, which would take into account what the money was for.

borrowing to take place without further legislation. In the Bill's second reading, Industry Secretary Sir Kelth Joseph said he would like to see British Telecom invest about £2 billion during the year

British Telecom has welcomed the principle of the amendment, but a spokesman said detailed discussions would still be neces-

The scheme would also require ap- sary after the Bill became enacted.

NEL Courses

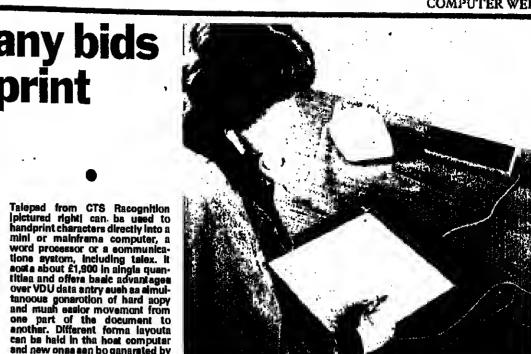
Seminar on CAD/CAM systems in Machanical Engineering, 1-2 April 1981.

This seminar, for technical staff involved with computers in the design and manufacture of ineering producte and components, elms to provide an in-depth appreciation of several computer systems currently aveilable.

The Design of Heat Transfer Plent by Personel Computer Systems, 8 April 1981. This course is intended to show manufacturers and users of heat-exchange equipment how they can take edventage of the latest developments in computer technology. The Principles and Practice of Flow

Measurement, 27 April-1 May 1981 A course for engineers, plant designers, plant operators and environe concerned with the purchase, use and callbration of flowmeters. Further details on these events can be obtained from:

P. Collier, Gonfarance Section,
National Engineering Laboratory
East Kilbride, GLASGOW G75 00U,
Tel: East Kilbride 20222 ext. 433
1 Telex: 777888



Texas cuts terminal prices

PRICE cots averaging 15% have been announced by Texas Instruments for nearly all its data terminates. nals and printers. They include a £200 reduction in the price of the 765 portable bubble memory ter-

Texas says that the cuts are mainly the result of increasingly automated production techniques but admits that the exchange rate

Exchange deal

CIT-Alcatel has concluded an agreement with Californian integrated circuits maker Semi Processing of Santa Claro under which they will exchange technological know-how. CIT will acquire 25% of SI'l capital and the use of SPI

You have every reason in the world to switch to NEC's "thimble" printers. re are 128 of them.

The secret's in the thimble, it hes 128 characters, instead of the more usual 96. You get 36 % more flexibility in handling paperwork than with most of the daisy-wheel end golf-ball print elements of other printers. In English, French.

German, Soendinavian, name it, And one

impressions. Quietly, quickly.

And that's just for openers.

thimble will lest more than 30 million clear

Thanks to our own LSI and microprocessor

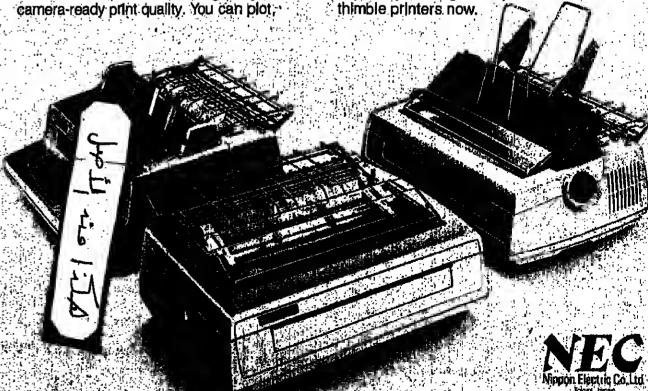
technology, the NEC Spinwriter Series 5500,

which comes in three models, gives you

subscript. Tab horizontally or vertically. And print bidirectionally. Changing thimbles and ribbons is a snap. .Also, system modularity means your Series

5500 printer will grow as your requirements grow. And one of the nicest things about it all is that it really won't cost you a thing to switch. 7 Interface capabilities, including those for Diablo, QUME and Centronics. means the NEC Spinwriter is ready to work In your system right away. Get close to our

graph, superscript,



or more information, please contact:
NEO Teleconmunications Europe Co., Ltd., NEC 16 (1997) - Report for the Street London NW1 3HP UK. Tel: 01-388-6100 Telex: 261914
Tracks Systems Ltd., Thame Park Industrial Estate The Mark TO 3RS Tel: Thame (084 421) 5471.

Downtime

Good old days of the 1980s

Sixties, when data processing average working week in our industry was 80 hours, and the

boss wouldn't pay overtime.

I fondly thought that such conditions had long since passed into the realms of myth and sicoholic

memories.

Not so, not so at all.

Don Martin, who runs the Sord importer Exleigh from the beautiful Cornish resort of Penzance, called on Computer Weekly recently. Leaning against the side of his car as he was leaving the office I noticed the mileage on the mileometer. It was 67,000. Don told me that he had elocked up that score in the one year since he had started in the microcomputer business. And worked, ss well. About a

Why does he, and why did we,

is still a young, and exciting place

Or because all the myths about the laziness of the British worker and the incompetence of British

management are as fictional as the infinite improbability drive? Perhaps the truth lies in a curious direction, with boredom as one of the signposts. You see, boredom begets inertia and iner-tia, rather than laziness and incompetence, has always struck me as the prevailing problem in our industrial world.

Rushing from Penzance to Nottingham to Liverpool to de-liver and install computer tion, when all your best programs have to be rewritten in the middle of the night, is tough, but hardly boring.

Language barrier!

INFANT technology took on a new meaning at a recent Press conference demonstrating progress in

The art of producing human speech by electronics alone is not the technology of tomorrow, we were tube shown, but of the here oad now.

To demonstrate the culmination of many years' work on the frontiers of science, there was a small doll. We waited anxiously for it to invite one of our party forward to be engaged in conversation, antil our hearts thrilled to the request "Please will you play with ma?" smakes in a perfect American account. with me?" spoken in a perfect American accent.

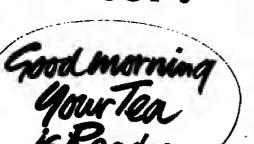
Later on in the demonstration, however, we were to discover that there are possibly still a few wrinkles to be ironed out hefore verbal communication between man and machine can reach its full potential.

The offending article was a coffee percolator which muffed its lines dreadfully. "Good morning, your tea is ready," it said, rather too confidently.

Intelligent machine

WE HAVE this clever IBM PBX in our building. It's so clever it won't let me phone the test mateb scores, or Dial-a-Disc, or the Speaking Clock.
We're not allowed to know what time it is. But what We're not allowed to know what time it is. But what really annoys me is, if it's so clever, why can't it tell that the connection it has supposedly just made for me is giving me nothing but allence? It's like the footman who keeps his uniform spoticasly clean and drops the parcels down the drain.

The other advantage of this syntem is that when the operator throws the wrong switch at the end of the day, she cuts off all the phones and not just one or two.





Relying on buzz words

THE revent and highly things debate at Cambridge University about whether structuraling is valid (or invalid) technique for invalid) technique for invalid may appear to inglish teaching may appear to the more pressive sawy for the more pressive for the more pressive for invalidations. the more prosaic concent / Computer Weekly resden.

There is a connection, though however tenuous it may appear first glance. How frequently he we heard that computer an have debased the coinage of the Linglish language, from the on in frenzied debate by the bate

For the non-sficioned structuralism (pace The Tue-is a technique used in lingui analysis which requires such a text to see how language in determines how an author wite

Perbaps it is not going look to say that computer persons are also influenced by the materials with which they wil Thus, buzz words become enertial instead of the abonimum which self-styled preserves of the English language claim the

GILB'S MYTHODOLOGY

Lost opportunities for automation

am preaching to the converted, or, depending on your experiences, that we have enough problems with computer systems without creating more.
To the first group, the

converted, I would say that we do not utilise nearly enough our op-portunities for simplification by programmed means. To the second group, those who

are fed up with computers; I suggest that the fault is not automation, but rather a sloppy and amateurish application of it.

What kinds of things can we simplify by more automation? The major area of underdevelopment stems to be in data collection. In addition, we are missing opposition.

addition, we are missing opportu-nities in system and program testing methods, and in building-in help to systems users.

Lack of training

In the area of data collection Ignorance, through lack of irsioing of the opportunities for automation. Most of them continue to design systems as if they had the technical constraints of electromechanical constraints. electromechanical punched card systems. A detailed exposition of the technical opportunities available was presented

Humanised imput book (Winth top), which detailed the opportunities we have for more powerful correction of human input strort and for viriation tolerance of insput.

For example, I recently worked with a large Scandinavian in strance company. One of their problems was in solving the two week delay between changes in insulance policies by agent and the point where I borreally up thated to the online databases. The solve in the classes was available to the online databases. The solve in the classes was available to the online databases. The solve in the properties and the classes was available to the online databases. The solve in the properties and the classes was available to the online databases. The solve in the properties and the classes was available to the online databases. The solve in the properties described with a name of the cloket information without any look-up of codes, and without any look up the propagation without any look up of codes, and without any look up of and for variation tolerance of input.

For example, I recently worked with a large Scandinavian in
strance company. One of their
problems was in solving the rwoweek delay between changes in instrance policies by agency and the
point where a correctly up dated
record of the change was available
to the online databases. The abitual
tion they were adding a was in
move in the direction of even more
integrated databases was in integrated databases and interedibly costly revoluted.

were caused by mail being seat back and forth, queues of work at the central office, and central office quality control procedures — which usually resulted in a need to ask the agent to correct or complete some data

What might seem obvious to some readers had not even been aired. It was to decentralise the data collection to the agent. At one extreme the agent could take a portable terminal on house calls, in he short term he could have one at ois office or home. The procedure of mail transport, validation of data and keypunching could all be automated without bothering the central office staff.

In another case, s European air line had entangled itself in a 250 work-year project plan, unaccept-able to management. Most of the able to management. Most of the affort was for centralising a database, but the major objectives were to reduce data collection staff by about 100 people for tickel fare data collection. They already had an online data entry aystem, so I suppose they did not think they could push things much further. On the other hand, most of the human affort seemed to go into eneoding ticket information manually on forms.

Direct capture

fashion).

The trick was not unity to stack the critical part of the system (where numan effort was presently wasted on automaiable tasks), but



Tom Gilb is an independent consultant, lecturar and nuthor on computing

Automatic correction of human error is an additional lost simplification opportunity. Most programmers and designers have no idea that this can be done and most have never done have never dane it or seen it done
incredible! In 1968-69 we designed a publisher system where
nearly every data element that
could be entered was capable of some degree of automatic correction (say 90%-95% of single character errors could be corrected without manual intervention). The logic for doing so was usually refreshingly simple to include

ing the computer how to handle the tieket codes. However complex it is, it is easily saved when com-pared with hundreds of people working delly for years at the task which can be automated This is the opportunity which I

I has is the opportunity which I find is all too frequently missed. We are too busy following our old traditions of simplifying input for machines. We don't see that the economics and machine espacity have changed. We don't see the opportunity we have to simplify the mindless encoding work by a little dash of automation.

Understanding

eustomers and author/title combi-nations — it could be done in 40 to 800 lines of Fortran depending on

the sophistication wanted.

How many of you have large staffs and large delays because of validation and correction procedures which could have been simplified by automation? plified by automation? Too many s the answer, I fear. How many of you still have great problems getting users to understand the system well, and yet

you still rely on courses and handbooks to teach them, rather than an extensive built-in help on an as-needed basis? How many of wolvestill sale on contrastings you still rely on convent program testing methods, and can hardly explain the automated tools such as deep file diagnosis programs, automated standards checkers, test path analysers, dual but distinct program code, automatic program structuring engines and comment assertion checkers?

Yet these are some of the lost reshingly simple to implement (the simplify the program test process most complet algorithm was for Automation can simplify more automatic correction to names of than st present.

FOURTEEN YEARS AGO

From Computer Weekly of February 8, 1967

Our Ten Years Ago solumn becomes Fourteen Years Ago for the period corresponding to the 1971 postal strike, which caused publication to be suspended.

LONDON University institute of provide Controls University Institute of provide Controls formed by the Department of duots a Education and Science that twill within the control of the Co

comprehensive details of pro-ducts and services dealist of pro-ducts and services dails to within the industry. The Link-sersity College of Cork. Blig 1620 has been called rifle service to invissigate the continuing protein of descoprapies daily from the historia wish province of companies. Whose population has falled from 888,800 co Cat and way the least 50 years.

FOCUS

When 8m are jobless

THE assistant director of the highly regarded Ashridge Management College, Jetemy Hall, hus told the institute of Marketing that the next 18 years will see unemployment rising to 8,000,000. The rapid development and introduction of the microchip is cast as the prime villain, aided and abouted by automation and low-cost electronieally-controlled praduction

Allowing for a tendency to confuse the microptocessor with a chip, the college does hawever offer some practical comfort. The new technology will offer the op-portunity for creating new indust-ries such as electronia games and bome computing. Presumably at least some of the unemployed will be able to bean thempolyed will be able to keep themselves

Prospects

Hall offers no solution to unem-ployment except that, in the longer term, prospects look brighter as "youngsters are trained in new in-dustries such as compitter software programming". That this could lead to further microchip-created redundancies was not proved the redundancies was not part of the

of a series of dire warnings on the consequences of microchip technology. Well known for its management consultancy services. Heidrick and Struggles, which employs some 100 search consultance. Heidrick and Struggies, which employs some 100 search consultants, has just compiled a top UK management computer industry report which shows that 60% of chief executives of large companies anticipate radical change and the trigger in this change is the impact of the electronic office, communications, and falling microsise architecture.

Think big

The report also anguests that in-reased commention and increased working capital requirements could had to the business fallows of away smaller firms and the forms

This attitude, however, det hold good in all DP condices Ainny of the mere successful affourishing computing computing computing computing computing to the control of t

or Stock Exchange listing.

Most companies which had dustry recognition as specific notably in office of the less. technology, are working a last technology, and last technology, and last technology, are working a last technology, and a last technology, are working a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, are working a last technology, and a last technology, and a last technology, are working a last technology, and a last technology, and a last technology, and a last technology, and a last technology, are working a last technology, and a last technology, and a last technology, and a panies offering cost-efficient ternative" solutions are hope.
For them, any hold-back is ready a vallability of the product.
The same picture emerge is

the service support indi Bureaux offering a spet Bureaux offering a spen operation are almost having the away work unlike, possibly, bulk of the service incom-Again, it is the specialist are ment company which is thinks not the general purpose variety.

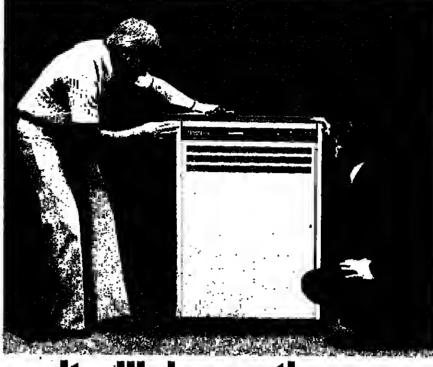
puter industry comments would dispute the suggestion the introduction of office of future technology successions about a reduction is the first about a reduction in the first about a red brings about a reduction in pany workforces. What it is duced in a greater workform is substituted in a greater workform in probably an improved ked cost-effective benefits.

sude the Hitch Hiker's Computer Galaxy, it was demonstrated that all office indire paths will lead to a several of data processing.) terpretation of information databases and enhanced menus for statistics; re-

As trade and industry increasingly competitive and fourte prospectly site the way of these organists which keep their response on the improvement

Introducing a computer too small to be a VAX, but too powerful to be anything else.

Digital's new VAX-11/750.



It will change the way you think about computers.

'AVAX'M virtuel memory computer for a price that almost eny organisation can afford.

A computer with virtually unlimited programming space, contained in a cabinet so small it barely takes up the corner of a room. Imegine VAX system power evailable to small departments.

For dedicated reel-time, interective and batch environments. Distributed throughout your organisation wherever it can improve productivity. And in a whole host of new OEM and end-user applications that were never practical before.

The VAX-11/750, from Digital Equipment Corporation, is so much computer for so little money it will literally change the way you think about computers.

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Despite its size and price, the VAX-11/750 is totally software compatible with the larger, faster VAX-11/780 - the computer that has been setting performance standards ever since its introduction.

It has the same kind of real-time response. The same 32-bit addressing: The same powerful instruction set. The same two gigabytes of user program spece. And the VAX-11/750 runs the seme VAX/VMS™ Operating

System, already proven in thousands of VAX-11/780 applications. You get an optimising a full ANSI 77

implementation. A high-speed COBOL based on current and anticipeted ANSI standards. A PL/I in the same performance class as VAX FORTRAN

Plus highly interactive BASIC, PASCAL, CORAL and BLISS. Because the VAX-11/750 offers total family compatibility with the VAX-11/780, you can run all your application programs on either system. Using the same data management fecilities that include sequential, rendom and multikey ISAM. FMS for screen formatting. DATATRIEVE for query and report writing.

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You can even build one comprehensive, corporate-wide network that includes PDP-11s, VAXes, Digital's large DECSYSTEMs, and your own corporate mainframe.

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.252-256 Kings Road, Reading RG1 4HS. Telephone: Reading (0734) 583555 I dike to know more about the VAX family

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MULI GOO						

We change the way the world thinks.

Sir Keith rejects plan for a **CAD Institute**

rejected a recommendation from ACARD, the Cabinet's Advisory Council for Applied Research and Development, for a Computer Aided Engineering Institute.

In its most recent study on computer aided design and computer aided management (CAD/CAM) a year ago, ACARD suggested that the advisory and bureau services provided by the National Engi-neering Laboratory and the work

space it took at last year's Leipzig Pair in East Germany, from March

15 to 21, and is expected to show computer products for the first

East German products on show

are expected to include 2 Mbps and

8Mbps digital telephone transmis-

from Nachrichtenclektronik; a

microprocessor-controlled

electronic local telephone ex-

change for 256 to 1,024 subscrih-

11/23 UPGRADE

KDFII PROCESSOR

256KB MEMORY.

FROM*

PRICE £2,150

change for 256 to 1,024 subscrihers from the same company; and a on the daisy-wheel mechanism.

LOW COST 11/23

THE Department of Industry has complete basia, as the NEL has interests in other research and development work, like automated small batch production. The Dol has also rejected the

recommendation that both the NEL and the CADC should be moved to a more central place than East Kilbride and Cambridge res-

Location near universities and industries is rated by the Dol as a higher priority than accessibility.
In its report ACARD suggested

on software development by the Computer Aided Desiga Centre should be co-ordinated into a single organisation or inadute.

In its report ACARD suggested that the Dol should take responsibility for producing and disseminating information on the subject through courses and seminars. It indicated that the Department abould take advice on this from its

manufacturing organisation.

These range from software for

bank cheque transactions, railway

seat reservations, hotel bookings

and management information to run oo Robotron's IBM 370-com-patible EC 1055M, through distri-

buted processing minis for process control, data collection and test

processing, m daisy-wheel printers

and the microprocessor-controlled

range of computer products from Robotron, East Germany's biggest UK at £1,400.

11/23 CHASSIS

KDFII PROCESSOR

DLVII-J INTERFACE

PRICE £3,200

256KB MEMORY

CHASSIS 8 x 4

points and emphasised that it is already, trying other schemes to vide this awareness would come from an increasing proportion of its science and technology budget. ACARD's plan of maintaining a

Spokeamen for the Fair

criticised UK husinessmen for be-

ing reluctant to get off their stands and research the East German

market. They had also shown little interest in taking part in the conference, for which 130 lectures were scheduled.

However, East Germany's main

aim was to increase exports to the UK, since they had declined by 20% between 1979 and 1980, while

close watch on overseas development was also accepted, although the Department already has close links with science counaellors in Bonn, Paris, Washington, Tokyo and Moscow.
ACARD made five recom-

mendations concerned with education at all levels. One was that computing should be given more emphasis in schools; another that new courses in computer aided cir-Japan's fivefold attack on East German market

UK exports to East Germany had doubled - mainly because of a

FERRANTI'S F100-L 16-bit bi-

polar microprocessor has been selected by British Aerospace for

use in a apacecraft microcomputer

module under development at Ste-

venage. It is the only completely European 16-bit processor.

11/23 **SYSTEM**

KDFII PROCESSOR

DLVII-J INTERFACE

32 MBYTE HARD DISK

PRICE £7,860

64KB MEMORY

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DEC 11/23

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PRICE £13,400

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128 KB MEMORY

2 x RL02 DISK LA-120 TERMINAL

Space module



eading the field.

satellite television.

Analogue chips such as ampli-

will appear first, with digital ICs

report. The main markets will be

military and instrumentation.

telecomnis, data processing,

US manufacturers have upted

mainly for the less fruitful military

market, while Europe and Jopan

have gone more for the large

volume commercial markets like

Europe and Japan will

The other three involved retraining schemes for exiating ataff and managers, including postgraduatea.

In response the Dol has indi-cated that the whole area of engi-neering education is being exa-mined by the government because of the findings of the controversial Finniston report. Computer studies and CAD are limited by shortage of trained teachers, staff

and equipment.

Universities and polytechnics, with the help of the Science Research Council, are launching five

GaAs integrated circuit market expected to 'take off' this year

contenders for the leading perion. In the UK, GEC money produce custom device six GuAa technology in a few per time. Research and development being carried out at the link has search Centre. US manufacturers will not be

According to the report world market should read [1]. hillion by 1990 if no usions. tiers, modulators and multiplexers technological problems are a appearing during 1983, says the fore then.

The report, which is the sign of GaAs on MOS, in ond bipolar technologie, a soys that the world marke me con integrated circuit will me \$100 billion. It has been cater that in 1979 there were 4.61k

unpoly since before the pass

government came to pour to

Marshall has been vising manies to ask their view op-sible new services from the tast

Sir Keith's statement in the la

Stevenson points to Sir Kair remarks about specialised man microwave and point-to-pain

vices and says there would be

point in putting three in British Telecommunication

at the end of the day no leng

Air Cail is oot finalising up

in advance of the pessing it.

Ilill, but one possibility is now
tium of companies provides
vices via about 50 shared pro-

atations In the UK. A limit

vice could be started being

end of the year (given that it is passed and the Dol approved plan), based on the existing the

tal Test Satellite that he

mons last July.

were granted.

Second private firm may move into satcome

ANOTHER private company has followed GEC's lead in annuuncing its ambition to run satellitebased cumniunications services.

The company, Air Call, currently provides a rodio-paging service.

Walter Stevenson, a director, says that the company's hasiness is measage and data handling, and that to offer broadband transmission services — such es facaimile, data and televiaiun — would be a natural extension to its existing

Such services could use satellite or microwave octwurks provided by private industry; or they could be based oo British Telecum's networks, as value-ailded services, if the Department of Industry decides to allow this after studying Professor Michael Beckley's report, which was delivered last

Private industry has been en-couraged to think in terms of providing new cummunications services, not just because Sir Keith Joseph lus been talking alaut libendising British Telecom's non-

Telecom also plans to use for the 18 towns now on Intelpost

THE mail side of the Post Office has extended its intelpost international facsimile transmission service to 18 towns in the UK, including Belfast, Cardiff, Edinburgh, Southampton and Slough.

The service is based on Japanese transceivers made by Ricoh and supplied by Kalle Inforce, which are capable of transmitting an A4 page in two minutes, with back-up provided by British-made three-minute transceivers supplied by Nexos.

Prices are 52 for the first sheet

Prices are £2 for the first sheet and £1 for subsequent sheets. Documents can be se-transmitted in London for international links. The Post Office wants to extend the service as soon as the market allows and is reported to have

asked the Government to me the British Telecommunicate Bill to give it a monopoly and transmission of hard copi electronic means. THE mail side of the Post Office

The government is under

Nova Basic

A NEW release of Beric as MicroNova and Nova - mais being launched by Dell (as The firm describes MP/bers high-level programming with a number of posent sions to the ANSI that make it snimble to scientific and educations

Fully fitted computer suite Oxford Circus

Entire Floor Available
Approx. 8,820 sq. ft.
Parking spaces for four care * Telephones installed * Air-sonditioned

* Passenger lift

Fortronic on verge of exclusive European marketing deal with ICL

up to avoid losing balances.

contract are often far less.

Spain alone bas 350 banks, and

is seen by Archibald as a very promising market, along with Portugal and Switzerland, for the

foreign exchange system.

All three could follow the lead of customers in the British Isles who

have opted for the product, like

Barclays with 450 terminals, the Bank of Ireland with 100 and

Potential

Archibald spent much time or

his tour simply standing in bank

branches observing procedures for dealing with customers. Cities visited were Madrid, Barcelona, Geneva, Zurich, Salzburg, Bezne and Paria, and Belgium and Hol-land were covered later by a col-

league,
West Germany was missed our
because, according to Archibald,
decisions have already been made

there about replacements for exiat-

and 2,500 Fortronic terminals

But he expects between 2,000

ing terminal equipment.

just 25 at the moment.

Midland and Yorkshire Bank, it

has already found its way into the

braoches of several of De la Rue's

BANK terminal manufacturer Fortronic of Fife is currently negotiating an agreement with ICL that will extend the latter's marketing rights of Fortronic kit to s worldwide basia. Last year, the two firms signed a deal covering the UK and Ireland.

Fortronic marketing director Bill Archibald said that the deal might exclude the US, where ICL's presence was limited, but European countries like France, where ICL is a major force, plus Spain, Portugal and Switzerland

were seen as very promising.
Archibald added, "We need firm assurances from ICL of business we can get out of the agree-ment before we sign."

New features

Archibald spent more than three weeks late last year visiting banks in Spain, France, Switzerland and Austria, ostensibly to demoostrate an existing Fortranic product, the foreign exchange terminal, but also to determine what facilities they would most favour on the F55, the yet to he announced auccessor to the existing Fortronic Transaction Terminal System. TTS is the hardware forming

the basis of a variety of Fortronic terminal products. They include the foreign exchange terminal and the cashier terminal installed already and totalling around 2,000 at 300 branches of the Clydesdale Bank in Scotland - Fortronic'a first major contract.

The F55 will offer new featurea like a tilting VDU with 12 or 16 lines of 40 characters each, a full alphanumeric printer and three Motorola 6809 microprocessors compared with just one less power-ful 6800 in the TTS.

There will also be four interfaces at the back of the F55 for peripherals like OCR readers, Querty keyboards, passbook and document printers and 4K bytea of

Barclays pilot order for 1,000 terminals

first users of Fortronic's new F55 banking terminal having placed a "pilot order" for 1,000 units to be used at branch counters. The F55s will be supplied by ICL which markets Fortronic kit in the UK.

Barclays will no doubt be com-

paring the F55 with the 1,000 counter terminals being supplied by its competitor, Philips, for the same functions and will decide whether the additional 5,000 units needed should be his limit to be additional 5,000 units needed should be his limit to be additional 5,000 units needed should be his limit to be additional 5,000 units needed should be his limit to back office computers installed at most Barclays branches.

While ICL is handling the selling side of the contract with Barclays, Fortronic their will applications will looked online account inquiries, cash dispensing without cheques and the related authorisation of Barclay. The company's headquarters is at Duisfermine, Fite.

Barclays is leading the other white Icl. is handling the selling side of the contract with Barclays, Fortronic their will provide first lide maintenance services and its setting up engineering centres. In Manchester and London for that purpose. The company's headquarters is at Duisfermine, Fite.

Barclays is leading the other white Icl. is handling the selling side of the contract with Barclays, Fortronic their will provide first lide maintenance services and its setting up engineering centres. The company's headquarters is at Duisfermine, Fite.

Barclays the F55 with the 1,000 decided whether the additional 5,000 units needed should be added of the contract with most Barclays bandling the selling side of the contract with most Barclays bandling the selling side of the contract with most Barclays bandling the selling side of the contract with most Barclays bandl

branch.

According to Berclays the branches. This makes might countries and halfs being for the 2,500 branches. This makes might countries tembrals will complement the Fortronic/CL combine. Burling than take over the work than take over the work handles by the Burneyhe B80 possible afternative suppliers.

Another role for the TTS is that

of them probably by ICL and with of a controller for a cash dispenser manufactured by De la Rue. Besides being sold in this guise within the UK 10 banks like the

ICL providing customer support.
Archibald quoted the study published last year by consultants Pactel, which forecast a potential market of 300,000 units for the kind of equipment built by For-

cootioental banking cuatomers.

Bill Archibald said that De la He also predicted that Fortronic would manufacture about a third Rue assisted him to contact key of the 40,000 terminals that Pactel data processing people in the banks he visited and that "magnificent assistance" was also provided by the British Overseas

Trade Board before he started his the processing people in the banks to order over the next 10 years.

Fortronic's main competitors will be companies that are many times bigger like IBM, Burroughs,

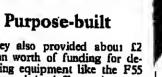
will be companies that are many times bigger like IBM, Burroughs, NCR, Philips and Nixdorf. With turnover of around £3½ million Unlike the UK, where the banking market coasists of a handful of over the last year, Fortronic is a very large prospective customers, the number of banks on the Contiminnow in comparison.

the number of banks on the Continent is far greater and the risks involved in bidding for any one trusts which have provided the company with the credibility

They also provided about £2 million worth of funding for developing equipment like the F55 and have helped Fortronic to go shead with plans to move out of its two small factories and into a purpose-built aite. Backing has also come from the Scottish December 1999. come from the Scottish De-

but to provide cuatomers with first-line support to avoid losing touch with them.

The Fortronic kit at the Clydes-

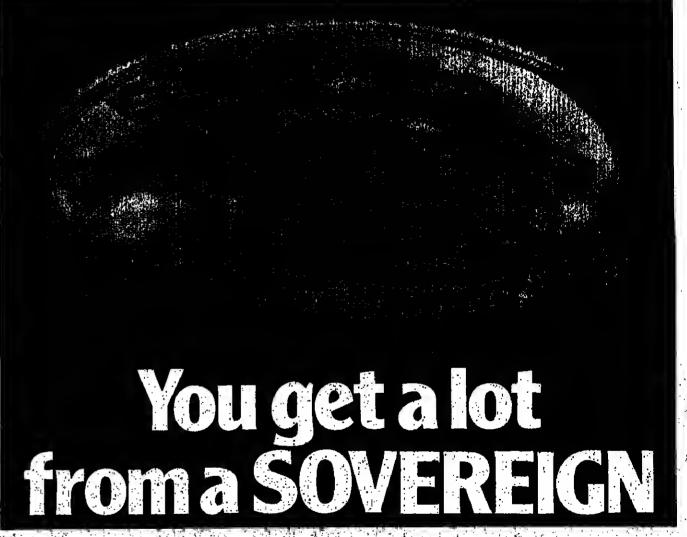


velopment Authority.
Fortronic's UK policy is to leave marketing of its kit largely to ICL

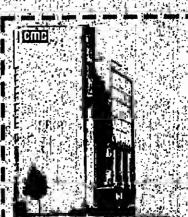
dale Bank bas climinated the re-quirement for paying-in slips and also for a cheque when a cuatomer is drawing on his own account at any Clydesdale branch.



He demonstrated it to prospective hanking customers in France, Spain, Switzerland and Austria late la yaar in its foreign exchange role. He alan assessed whet facilitia Continental customers might require on the F55, the successor to the TTS which has yet to be formally launched. About 1,000 F555 are to be installed by Barcleys Bank es counter terminals.



Clydesdale Bank's Stock Exchange Services Department prints its share certificates on a SOVEREIGN - CMC's multi-function



multi-processor system: I am thierested how SOVERBIGN can cope with this and the following all of the same time Multiple Data Comms
Batch Processing
Data Preparation
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P. 18 ...

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HP packs more into calculator

AT a time when the trend is to pur computing power into amaller and smaller packets, Hewlett-Packard is doing the apposite and increasing the amount of computing power in a standard-sized package

- a calculstor.
With the introduction of the HP-41CV, Hewlett-Packard claims to have achieved the most powerful hand-beld machine avail-

But the company still calls it a calculator even though it is capable of more than Sharp's PC1211 "pocket computer".
The HP-41CV is an enhanced.

version of the original HP-41C programmable calculator, boosting its memory size five times to 2K-bytes of RAM. With a maximum capacity of 32K-bytes of ROM, the 4ICV costs no more than its predecessor, £170 plus VAT.

The extra memory frees all four external ports which were occupied in the original by memory expansion modules. They can now be used for plug-in peripherals.



Hewlatt-Packnrd's new personal computer, the HP-83, is identical to the previoun HP-85 spart from the lack of integrated printer and tape drive, it costs nbout £1,200 plun VAT.

PT7.The thinking man's

alternative to

IBM 3270 and ICL7502.

out verterment westermte (13M and ICL insers, 15 province die entralised

s e lang, with pleaty of nower at the ferrior a, yet at itays folialy integrated.

FERRANTI

Computer Systems

ERMINE CHIEFES CONTROLLED

ters or ot' ars, and the HP plotter,

One of HP's ideas for the future is customised ROM to enable the user to attach his own application printer. It is available at a lower price, £1,210 plus VAT, and is aimed at business and technical professionale who wish to add a disc drive or an external printer. Both the 83 and the 85 can use

On the personal computer acene, HP had given the impres-sion that it would be announcing a two types of HP flexible disc drives providing storage from 270K-bytes to five megabytes. They will function with HP prinnew device about now. And new it is called, but in fact it is an eohanced version of HP's first personal computer, the HP-85.
The HP-83 la identical to the 85, and support the company's own version of Visicale which uses

which was introduced last year, except that it does not have the integrated tape drive or thermal

MEDL pips Racal and GIM at post Ltd, the joint semiconductor cu-terprise of GEC, is to start volume chips at a reasonable cost. Its costchips at a reasonable cost. Its cost-

production of semi-custom chips using ISO-CMOS technology at the end of this year.

This announcement by MEDL meana that the company could be in production of silicon gate CMOS devices before its only UK competitor, the joint venture of Racal Microelectronic Systems and General Instrument Microelectronics, which was set up only three months ago.

Oxide-isolated silicon gate Oxide-isolated silicon gate CMOS is referred to by some in the industry as "the close-to-the-ultimate technology". It features both the advantage of MOS technology, including low power consumption, and the high-speed advantage of blpolar technology, and this combination makes it almost an optimum technology. nost an optimum technology.

When used for the production of seml-custom chips, the combina-

circuit or system can be considered from o library of building blocks cells, kept as a common daube. Circuit layout and design checks is also carried out by the considered considered to the considered considered considered to the considered consi effectiveness could result in ita being preferred over the microprotion speed from 6-9 months at cessor in many current applica-ISO-CMOS semi-custum chips

matter of seconds. could also be used olongside the This approach using its CMOS will now be referred by the company as ISO CELLAN microprocessor in many applicu-tions, ond could enhance future developments, particularly in the The devices feature access hope computer field.

MEDL was formed last year by 15 nanoseconds, opening in quencies up to 10MHz, TTLus GEC from its three separate semiconductor ontities: Marconi

patibility and battery operate a cost of about one cost percel Space and Defence Systems in Portsmouth; AEI Semiconductors in Lincoin; and GEC Semiconductors at Wembley. A US company, Circuit Technology, was ac-quired last year as the last part of MEDL, in order to give the com-psny access to the US semi-custom gates should be developed by a middle of 1982. Power district will be around 10-50 microwa With British Telecom ond Ples-

MEDL's only competite in it.
UK semi-custom market pages
con gate CMOS, a joint raise
between Racal Microelectric sey, GEC obtained a licence from Canadian teleconimunications manufacturer Mital for its proprie-Systems and General Instrument ary ISO-CMOS process. Derek Microelectronics, is concerned on o different type of less known as the ULA, uncommal oberts, GEC's research director, rates the technology as the best available.

MEDL will sturt trading under

> The ULA method use for CAD facilities and lighter greater element of reducing Only a few different cells and rather than a library, and hate

However, in the loss and RMS and GIM should still has advantage over MRDL, as a silicon gate CMOS is bear to veloped with a strinking capable — that is, they should be the tomodify the technology does two microns, thus enhances the performance aven more.

to the ULA method but on instance in the basis. ISO-ULAMOS methods proach. With the help of compu-ter-aided design equipment, a year with 1,024 gates and 1120

Working at 3-4 micron, is ISO-CELLMOS devices will be a density of 50 gates per mag millimetre and a complexity of a to 2,000 gates. Devices with 5/4

ORIC ATTRY. The venture was anomal three months ago when Riday GIM thought that they would first in Europe with a siles property of the control of the co that name from April 1 under the direct management of GEC-Marconi. Its main market will be semicustom chips for defence, telecom-CMOS. It now looks as the munications, TV and viewdata, MEDL will get there firm # 14 and GIM have still to develop a a technology, although the start in collaboration the letter the Leuven University Religion Belgium. A new factory has been set up in Lincoln tu provide an extra 60,000 square feet uf space far production of seml-custons devices. This can be expanded in the future tu pro-

MEDL has also committed

IBM floppy-Zilog interface

STANDARD IBM floppy discs can now be used in Zilog's Z80-based MCZ-1 series of microcom-

vide another 200,000 square feet. MBDL foresees that the semicustom market, in terms of design

alone, will be worth \$100 million

this year. Mass production after the design procedure will produce a market wurth \$300-\$400 million in two years' time, growing into a \$1 billion market by 1986.

According to Bert Sadler,
According to Bert Sadler,
MEDL's managing director, the
company plans to take 40% of the
UK semi-custom chilp market,
-15%-20% of the European
market and 5% of the US market.
He sees this as the basis of main

He sees this as the basis of main future growth, reaching £50 mil-lion by 1984, MEDL's main semi-custom de-

vices use the CELLMOS ap-

A combined hardware/software package called the Z-IBM option provides the user with the sbillty to pass information between the floopy discs which use the basic IBM exchange format and those using the Zitog standard RIO Graphics package REVERSE video and Personnel.

REVERSE video and Prestel-type graphiles for the Superbrain personal computer are now available from Icama Computer Systems in London, the major UK distributor. The package, which costs about £100, Ilis directly onto the Z80-based system which runs the CP/M operating system.

Apple filing system

VISICALC UK's distributor ACT Microsoft; now has available a data management system package which is supplied on flooply disc for the Apple II microcomputer for arband 175. DMS stores information otherwise kept in a indger or file, updates and restricted information, and sessently and settlement filing system.

operating system formal.

The package consists a secondary floppy disc controls handle the IBM soft securification of the secondary floppy disc structure and software. Its associated Z-IBM software the form of a secondary system which allows the toping files in either direction between the RIO file systems and the life of the RIO file systems are systems.

flooppies.
Use of the package, which he for the package, which he for the package, which he for the package of the pystems.

Starting in March
THE model 3/30 microscopy
system from Raif a Back for
range, which is equipped with
SV-inch Windhester the
shipped at a rate in March
month, starting in March
system is available for 13,750

Direct mail venture Hard disc micro OS

A HARD disc operating system for micros is being Introduced by gets under way

SOFTWARE FILE

TORY . . . "A change in the relationship between the software industry and its customars."

Can an accounting package

save you?

I would like to know the full NSC story.

The state of the s

Batch or real time?

by Keith Jones

COMPUTER Associates has unveiled three new products to be sold through Express Software, the telephone and direct mail-shot marketing venture that it iotroduced to the UK last week. There are also two new products for OS Improve products accounted from the two new products for OS users is CA
CICS/VS. The whole aim is to see the two new products for OS users, the two new products also to be sold through Express Software will include the company's well established the two new products also to be sold through Express Software will include the company's well established the company's well established the two new products also to be sold through Express Software will include the company's well established the two new products also to be sold through Express Software will include the company the two new products also to be sold thro marketing venture that it iotro-duced to the UK last week. There are also two new products for OS users that will be sold by CA's

mainstream marketing operation.
The Express Software products are RAPS, Remote Access Power Support, Data-Go, a test data generator for DOS, DOS/VS and DOS/VSE systems and Libra + which provides job control and diagnostics features for systems

programmers.

RAPS enables users to secess disc-held Power/VS (E) print file queues from a 3270 terminal uoder

Improve products acquired from CAP wheo it ran dowo CAP-CPP at the end of last year. They are the Improve/CICS, and a mes-

Renamed

products, Improve/RT and Improve/DS, are being renamed CA-Detect and CA-Dynam/DMF respectively. CA-Detect enables DOS users to locate a bottleoeck in the system, for example if it is I/O or CPU bound. CA-Dynam/DMF system which complements one of

Jasper, s job accounting, performance evaluation and billing aystem that measures system utilisation.

New for both DOS and US users is a report generator called

CA-Dart, an extension to sort output file handling.

Express Software operations already exist in West Germany, Itsly and Benelux as well as the US. David Tory, now vice-president of CA's US parent, Trana American

Computer Associates, and the rush in charge of the company's atrategy and future sales com-mented: "Direct selling by mail and telephone really reflects a change in the relationship between the software industry and its cus-tomers. The software industry is growing up and maturing."

Equinox Computer Systems. Called PDOS, it offers, says Equinox file management facilities and complete user-file security. The company says that these features have not been offered on micro-based

PDOS has been designed from scratch to take full advantage of the latest hard discs available, including Winchester disc technology. It is implemented using the full Z80 instruction set and is upward compatible with CP/M.

ble with CP/M.

Up to 16 mas a storage devices, including floppy disc, cartridge disc, Wiochester disc and magnetic tapea, in any combination, can be supported provided they are only 256 megabytes or less each.

A separate directory is supplied with each discusser area to maintain information like date of creation, date last modified, protection code. user numbor and file description. PDOS eao also maintain a commo

High-speed packages

ware is to be marketed by a com-pany called Microdata Synamics formed especially for the purpose.

The company has started its product line with two high-speed packages, VSAM-Assist, for backing up and recovering VSAM data sets, dumps data 300 times faster than AMS and using only 25% of

the CPU, says the company. The second product is a term nal sharing system (VTF) for OS/VS and online CICS users. It relieves users of the need to have a

application. Any online termina cao have accesa to multiple online

systems.

The two products were developed by Softworks Inc.

Roscoe interface

THE access/control package Secure, from the Boole & Babbage owned European Software Coopany, has gained an interface with the online development system

Your computer should spend its time solving problems not looking for them.

It happens at a lot of companies. The computer gets burdened with more and more trivial information from everyday."

Invoices, delivery notes, employee records and suchlike.

Until it becomes little more than an automatic filing system answering queries

Kodak has an alternative. It's called the KODAK IMT Microimage Terminal IES.

It's quite simply a microfilm reader that, when linked to a computer, will relieve it of all the "paper work" it

is storing.
With a little help from the computer it can actually give you a copy of any document you need in seconds. And, most important, it saves on expensive computer storage leaving the

computer free for more complex work The KODAK Komstar Microimage

The KODAK 'Komstar' Microimage
Processor is another highly advanced
computer peripheral
Linked to your computeral will
actually produce print out or
microfilm
Unlike previous COM
set ups if is completely dry there are no
chemicals whatsoever involved.

If your company uses migrofilm you should find out more about these latest developments from

Seart by filling in the coupling

Well make sure you're running a computel.

Not a filling system.



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ment to a full set of accounts.

The Bill also proposes the aboli

ICL shares crash on news of £20 million loss

quarter of the current financial year, ICL shares crashed in 24 hours from 46p to 32p. By last Priday (February 6) they had ral-

lied to 37p.
The collapse seems to have been centred on market fears, whether justified or not, about the com-

Debt at the ICL group rose from £15.4 million in 1979 to £44.5 million in 1980. Long term debt rose from £99 million to £116.8 million. ICL paid a grand total of £26.3

	1979	1980
O'draft Short term	£12.6m £2.8m	£20.7m £24.2m
	£15.4m	£44.9m
Long term	£99.0m	£116.8m

ICL's group debt.

amounting to more than half the about £35 million, or less if MLR sible, this is the most likely tway for trading profit of £51.4 nullion.

The chairman declined to answer in detail questions at the annual meeting about the company's cash flow, However a detailed look at the effect of an overall loss of £35 million – a figure implied by Philip Chappell when he predicted a reduction in the loss for the second quarter and break-even for the second half of the year shows the following.

level. On an averaging basis this implies an outflow of £25 million

per quarter, or £100 million for the

year as a whole. That would take

the ICL group's total debt to over

At current interest rates of 14%,

It's time to put our cards on the table...

There are other considerations.
The quarter in which ICL made the loss has been uniformly reported by American and internstional companies as very difficult. The overall cash outflow for The coming quarter, according to 1980, taking the leasing subsidlamany company chairmen, looks ries into account, approached £100 million. According to the chair-man the cash outflow in the first quarter was held at last year's

This kind of loss could be sus-

sion, upon which Chappell places so much emphasis for ICL's recov-

ery, would add to the drain on cash

s the debtors ledger total rose.

Recovery in Britain on the other hand, with the economy so deeply in recession, could be swift.

A reversal of the government's moratorium on the 1900 replacementa, taken with an early placing of specific orders for the PAYE contract, would have swift and imnediate impact on ICL.

With Mrs Thatcher determined

at epeede up to 72 khit/s. V24/V28 compatible, with

MPS 3021-one of a new genaretion of

duplex asynohronous operation up to 300 bit/s

ALD-1 - an asynchronous lina driver providing short-haul, point to point operations over twisted pair cables at speads up to 9800 bit/s.

SLO-1-a synchronous line driver for short-haul

over 2-wire diel-up or leased circulis, Fully V21

microprocessor-controlled moderns for full

the government to help ICL.

Barclay's Bank, one of ICL's main crediturs, issued the foltained by a company for a short period, but the ending of the receslowing statement, with ICL's agreement, immediately after the annual meeting: "We are well aware of the problems the company faces because of the current difficult trading circumstances, as we are aware of the chairman's statement inade at the extraordi-

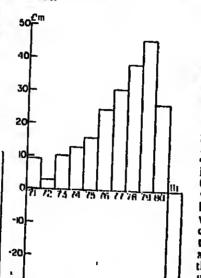
nary general meeting.
"We, along with the company's other banks, are being kept fully informed so that we can respond appropriately as the company's plans to surmount its difficulties

"For the time being we are satisfied that ICL has adequate unused short term borrowing facilities at Barclays insists that the state-

ment should not be interpreted as s request to ICL to make its recovery plan more specific.



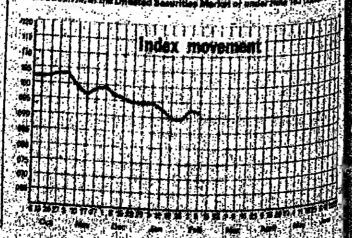
ICL shere price movement,



iGL'e profits 1972/81. The liqure lor 1981 is based on the chairmen's and chief executive, which estimate of e £20 millinn-plus loss in the first quarter, e reduction of this loss in the second quarter, and break-aven for the second half of the title electronics office best systems would continue as a particular to the second half of the profits the second continue as a particular to the second profits and chief executive, which is the chairmen's and chief executive, which is the profits and chief executive.

Mrs Thatcher told 40 investors those setting up small common who attended the event that the government wanted to help, not hinder, the growth of small high

Paties	London Broot	7	~	A. C.	11.00	US Side	1.1
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数	Andrew Inc.		77	A STATE OF THE PARTY OF THE PAR	-	property Company Compa	



Northen

in 1978.

PM hints at tax reliefs

IN a paper on small companies in Europe, the EEC Commission in tarm notes the ambatantial contribution technology FURTHER hints on the likely technology companies. made to the gross national proshape of small-company tax

A report prepared by it of
concessions have emerged from a
inet Think Tank include any duct of various mamber states by small firms. The contribution was put at between 30% and 60% tions for personal tax teld !! of total GNP.

The Commission has recommended to the Council of Ministers that the EEC should take a



AT&T rings up £2.58 billion profits

AMERICAN Telephone and Telegraph, owners of the Bell Telephone System in the US and a major force in the growing field of data networks and transmission, has announced divest AT&T of its telephone subsidiary, on the promote competition, now faces an uncertain grounds of alleged anti-trust activities.

Turnover rose to £21.5 billion, from £19.3 billion in 1979. Profits rose from £2.4 billion in 1979 to £2.58 billion in 1980.

in Paris last week. Brûlé said: "1980 was not easy

because we had to cope with high

demand and manufacturing prob-lems. In spite of a big challenge I am confident we will have a good result in 1981 although the first quarter will mean a difficult start."

Profits for 1980 totalled £16.4 million, an increase of 60 per cent

over 1979 when government subsidies for the two years are discounted. In 1979 the company received £10m and in 1980 £1.9m

positive interast in the de-valopment of small firms. The recommendation was made, on the basis that "with the da-

vefopment of the new technolo-gies, small and medium sized en-terprises will prove forerunners

of the eventual structures of in-dustry as a whole,"

plify Customs procedure and a

Business Co-operation Centre has been set up at Rue Archimede in Brussela. The object of the BCC is to put small firms in touch with each other and with

potential markets for their products. The BCC has been in exis-

tence for seven years and is rated the EEC's more successful

GREATER MANCHESTER POLICE

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to enive no later than Friday, 20th February, 1981.

Chief Superintendant Rankin 061-786 9857 ext 60

Only written responses to this advertisement will receive consider

grounds of alleged anti-trust activities.

With the explosive growth predicted for telecommunications AT&T is more than anxious not to lose its potentially most profitable divisions.

AT&T is the biggest telephone company in the US. Hints have appeared that the company by converging technology, such as AT&T's

The 1980 results are good news for Honeywell, which still has a 47 per cent stake in CII-HB, and also

for the new dominant partner, Saint-Gobain-Pont-à-Mousson.

CII-HB calls for £82m

for ambitious launch

into office machines

schieve a final total of £569.5 million, of which 43.3 per cent was represented by exports, chairman Jean-Pierre Brule announced by new fund-raising ventures on the international money

EEC takes an interest

in small companies

market.

FRENCH computer giant CII-Honeywell Bull, which has honeywell Bull increased turnover by 22.7 - per cent last year to schieve a final total of £569.5 mil-schieve a final tota

Investment

Companies Bill will

AT&T last year spent £7.3 billion on construction and investment in new communications facilities and is obviously anxious to see the ani-trust suit settled. No doubt it hopes that the Communications Bill will, like the Ad-ministration which drew it up, fade quietly into

week, seems set to remove some of

Companies. They will not have to file a profit and loss account or a

cut paperwork

THE new Companies Bill, holders will retain their entitle published by the government last

> the worst paperwork burdens fac-ing small firms, particularly those tion of the registry of business names. Although this is seen as in the computer industry.
>
> Small companies defined in the help to small companies, the mea-sure is primarily designed to save money for the government. Credit agencies and others have registered Bill as having a turnover of less than £1.4 million and a balance sheet total of less than £700,000 a strong protest with the govern-ment over this element of the Bill. and not more than 50 employees, will have to file only an abridged balance sheet with the Registrar of

Magistrates are given the power to disqualify anyone from operat-ing a company if convicted of fraud.

MCS wins £280,000 order

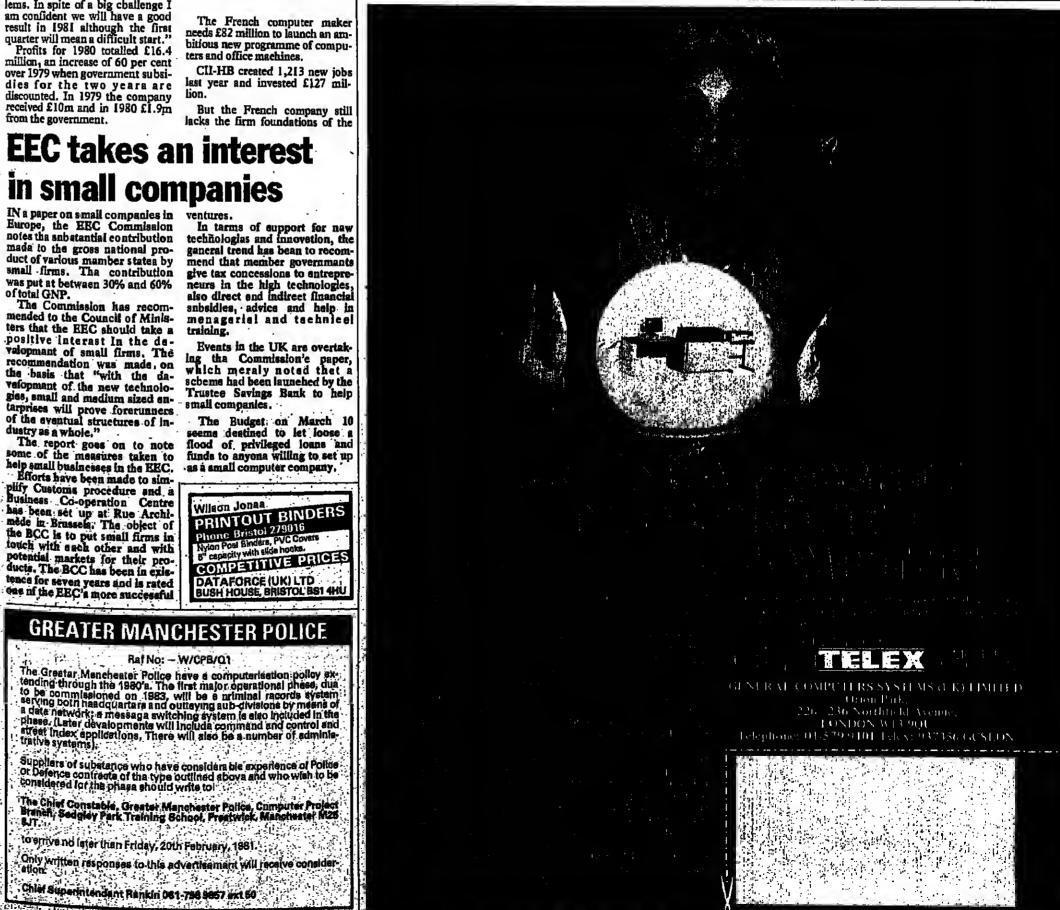
order processing are the two main applications for a Digital Equipapplications for a Digital Equip-ment PDP-11/70 system ordered by the aupplies department of Kent County Council from Man-agement Control Systems. The contract is worth £280,000

to Management Control Systems

WAREHOUSE stock control and IBM and ICL. The 11/70 wil mainframe system and is the first DEC commercial system to b installed by a local authority in the

UK, according to MCS.

The 11/70 is to be installed at
West Malling, Kent, and will control a warehouse.



Comilink IV-a general-purposa baseband point-to-point or multidrop use et speads up to 19,200 bills over twisted-pair cables ...orin a rack

Heving the world's widest range of modems.

you'd think that Racal Milgo hae no need to

its all part of the established Recal-Milgo

Its all part of the established Recal-Milgo
policy of providing you, the user, with an even wider
choice of modern—each one designed to suit your
particular application. Using the letest proven
technology and all our innovative exilis to maintain
dur leadership in the field of data communicatione—

Not a bit of it.

and to produce lour more winners:

available in two versions: with its single pic b card housed in a table top case, or in our high density 19 rack mounting card nest giving a total modern trilermix.

Capability

And we've one move ade up our eleeve.

LS I 2401 - a 2400 bit/s, V26 compliant modern for synchronous point to point or multidrop apprending over leased lines. It is also available aither in table to form or as a vertical card for high density certifal site.

packaging. So, whichever way you choose to play your cards, you will with Racal-Milgo.

Phone for immediate information.

Telecom £78m loss

NORTHERN Telecon Lie Canadian telecommunication unmufacturer, reported fally, loss of £78.8 million on investigation in 1980. This expares with a profit of £41 million. in 1979. Much of the loss was made

hy the company to in community write-down of 1691 million the fourth quarter lat parters peet of the operation of the Corp of Minnespells in the Corp of Minnespell in the Corp of Minnespells in the Corp of Minn Corp of Minneapolis. The significant consists largely of his Sycor Ioc and Dan 100 C which Northern Telecom his 1978

The purchase was an among

All foreign company tenth of ished in Company tenth of converted into sterling at the same the Financial Times on the financial Times on the day preceding publication in used this wask were look of 2.35c. Franch Iranes 10. 2.35c, Franch Irance 11, Date

its role as male supplier of Canada and Northern last was swiftly hit by prolific tines which it could not have with its existing lines. Probable costs at NTSC were much like than enticipated and the series sidiary failed to hold on to series the managers they had some with the Dats 100 and Spirit

reception at 10 Downing Street.

Mrs Thatcher told 40 investors

The charte index is besid on the prices in Landon on Pridey and in America M. The share index is besid on the prices of the UK compenies in the label for Lowe have been adjusted where security.

Shares dealt in, in the Livileted Securities Market or under fade 141 (186).



Grag Hayas and his TRS 80 microsomputer. But whet's a systems programmer and a small machine doing on a page for operators? Sas story balow.

Emulating experience

essentially practical, is that people ean't be expected to learn the tricks of the trade without actually operators, or trainee airline pilota come to that, by carting DC 10s and IBM 360s into the classroom. The alternative - on-the-job training so called - is also expensive and potentially disastrous. One solution is the provision of

some kind of emulator. Greg Hayes, pictured above with his TRS80 microcomputer, was commissioned by Malcolm Fry to prepare on operators' emulator. Fry wants the emulator for the newly-formed Protocol Opera-tions education outfit and it will be demonstrated at the first event today, February 12, at the Coburg Hotel in London.

"It's overstating the case," says What happens is that If the student

Spread of British owned trucks

T-shirt offer Burn some rubber

The paper show the too late.

and our special CB cap and

A PROBLEM about training operators, or for any job which is the TRS80 emulates a Power VS

The micro is designed to reindoing them. It is expensive and difficult to initiate trainee offers the beoefits of having them force the lessons that beginners use a keyboard miles away from any mainframe. What the studeot sees is a eplit-screen, in the top two-thirds acting as a Power console with the remainder given over to student information.

Three attempts

The present course demands that 24 Power VS prompts are learned so that the commands can be keyed in by the student. A handout asks: "DISPLAY THE PAYROLL PRINT ON THE QUEUE" to which the atudent uld respond by keying in "D T, *P". The student is allowed three attempts and the correct response in shown on the screen after the third wrong attempt.

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and w

rigand photos and specifications of other rigs in the Midland range clips all over the U.K., a full colour plus feaders is details of CB clubs all over the U.K., a full colour plus feaders is details of CB clubs all over the U.K., a full colour soread of British owned trucks soread of British owned trucks

tiona, the student la given a piece of printout which details the following: Course name, date, student name, question number, at-tempts made, whether the student made a correct response, and the answer. The answers can be lined up against the questions for future

Hayes prepared most of the teaching program in Basic and went into Assembler for scrolling the upper part of the screen. He built it around four files for the questions, the correct answers, the student file and the emulated res-

Hayes is well suited to bring the micro to the mainframe. He epends his days af an IBM 3278 terminal working as a self-employed systems programmer, and for relaxation he works on his TRS80. After his BSe in electron-Ica at Kingston Poly he spent a

Now everyone wants to be called 'manager'

The 1975 Computer Users' Year Book liated four operations categoriea; Manager; chief operator/ shift leader; computer operator; junior operator. Five years on and the list has inflated to include three more categorica: Senior operator: elecommunications operator; job acbeduler. (Incidentally in 1974

Categories

According to the Auerbach survey, American ops can fall into one of six categories. "The levels," It says, "have been identified statisti-cally by performing a frequency "have been identified statistidistribution on the actual salaries, paid all people within a particular modea (bell shaped curves) occur in the distribution. This estab-lishes how many levels of skill responsibility the marketplace recognises, as evidenced by octual

Levels A and B in Table I are operator grades which are min-utely distinguished in the pecking order. An A is "usually competent to work independently in most pleases and requires only some general direction. B is usually fairly competent to work on several phasea of the activities with only general directions . . ."

Bs carn less than Aa. New ops managers sometimes hang their hats on a restructuring of the hierarchy as a way of imposing their own version of a career structure. At one site I visited recently, the incoming manager had created an eight-level hierarchy from junior op ("It agunds nicer than trainee," he said) to his own managerial post. "Such a structure," he explained, "leta people know they are progressing and it lets them know that you

At another site I have been to, the ops manager was not even allowed to dignify himself with a managerial title let alone make Cos CB World is your kind of mag. It's for breakers by breakers humber in the soft of stuff you need to know. Like:

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Cos CB World is your kind of mag. It's for breakers by breakers by

OB titles seem to be proliferating assistant managers out of his aster than fall-out shelters these minious. Company policy dietated minious. Company policy diented that he be called superintendent of computer operations

But operations is not the only part of DP to have created more roles for itself. To return to the older, thinner, copy of CUYB is tn go to the days when 17 job titles could cope with any mainframe. By 1980, 23 categories were neces-

More job titles mean an increasing senae of importance which is also reflected in the ways Americao mainframe big-wigs have christened themselves through the years.

The machine accounting manager was top of the pile in the early 1950s but had evalved into o manager of computer aperations by 1960. A decade passed and the life form was starting the ascent to boardroom heights with the title of manager of data processing. There was no way that a mere muchine accumning manager could hustle a seat up on the hoard, but current US computer headmen belong there as vice-presidents. Junior, seniur, junior-senior and seniorjunior vice-presidents ure strange, tightly-suited creatures given tu laughing at jokes which aren't

fullny at oll. They are, however, in no imminent danger of extinction. Managers are nuty necessary

Supervisor/ \$23,900

Senior

rainee

ANNUAL

\$17,800

\$15,300

\$13,200

\$12,000 \$10,400

AVERAGE STERLING

ALENT

(\$2.35/£)

£10,170

£7575

·£5,617

£5,108 £4,425

TABLE 1: A comparison of 1980 UB and UK operations staff salary link. American figures courtesy of Auerbach Publishers, UK number that to Computer Users' Year Book.

SURVEYS, statistics and other generalisations are glways useful in an argument. It's reassuring to Other than that the famels know what Joe Average and Sue Median are being paid, even if you and there seems to be over the are carrain they don't exist.

Such mass statistics and other are good, median figure and they say, speak for they say, speak for they say, speak for median UK operation.

Invitational Computer Conferences

terperu

Manufacturers

DID you know that is (mails) manufacturing, firms pay you cope more than service from pay than labour intensive firms pay the US branks tend to see the US branks tend to see that the US branks tend to see that the transport of the tend to see the transport of the tend to see the tend t

pay more

How UK and US ops'

salaries compare

Median are being paid, even if you are certain they don't exist.

Such was the interest in the pay figures published in Op Spot a few weeks ago, that I have dug up a few more. The table below is from Auerbach's Salary Trends in DP Operations and from the 1920 Computer Users' Year Book.

A couple of points should be made: Firstly, the UK salary figures include regular overtime and shift premiums where appropriate, secondly, the US salary figures are averages and salary averages tend to be distorted by the occasional exeptionally high salary. Assuming that the sources

Such was the interest in th

ment services manager is intelled. "He would be likely," at CUYB, "to be regarded to clearly so if his title is a mane ment acrvices director) as hive higher status and a more age

Ops managers range in machine minders minding me machine minders to the many director's golfing partner, in sections aliations the job tiles we suggest all chiefs and no loss.
But why not? Nearly stage

wants to be dubbed a manage. Newspapers are just as but. esteemed competitor of CF be staff of 15 people responsible preparing copy. Nine of them he the term "editor" somewher their job titles.

Etiquette

These things are import though. "What do you do?'s tive might like to ask all sons things about religion, post

UKJOB

Operations £7545

£1875

28531

manager

operator

Shift :

iaader

operator

tinkling of the variable door chimes as background muzak -Liquette forces the inquisit they can be programmed for an to wait, but no social graces, stopped the question, "his you?" endless permutation of ootes ooe follows the compact layout of the best-designed homes. It's pleasant to have an inge

electronic house isn't all that easy

on the domestic scene "CHIPS with Everything" entered common parlance in the sixues Diplomat system consists of a control unit, three magnetic awitches for doors and windows,

Your resultant curses can be recorded for posterity or later penitence, and pre-recorded cassettes with Arnold Wesker's play. In the Seventies it rook on a double mesning with the advent of the and a pressure pad.

PROGRAMMERS' PAGE

The next decade will

witness a computerised ravolution within the home

- efact discovered by PAMELA ROWE during her visit to the Microelectronics Come Home Exhibition et the Design Cantre in

London. The silicon chip stends poised to underteke

loyasian of every facet of life.

new styles of working life.

creased leisure for everyooe and

Silican chips have already made

inroads into some áreas - cars

"Microelectronics Come Home"

concentrates on the way British

investigated and with the constant

or rendar peiniase domestic tasks.

It can be self-installed and allows 25 seconds after setting to We have been promised great changes in the next ten years -which most of us anticipate with a leave the house, or the same time to reset if you've accidentally tripped the alarm, before a highfossoo of enjoyment - through its requency warbling siren is let The familiar forecast is in-

could find "Mole", a vacuum cleaner robot deaigned by J. McCormick at the North Staffs

built by robots, computerised ac-counting and automated stock-tak-This non-burrowing Mole contains a micro and memory chip; ooce this invaluable ally has ing; but its impact on the bome has yet to be realised in full. An exhibition winkling out the "done" a room, it never forgets and can reproduce the whole sequchips scattered around the average semi is now being held at the Design Centre, London, until March 7 and then at the Glasgow Design Centre from March 30 to May 30.

With seosors to detect alien objects, it ateers round the furniture and there's oo need even to mov the eat sitting on the mai.

It is perhaps in the living room designers and manufacturers are introducing new technology into everyday products. Each room in the family home is Besides the obligatory digita watch and calculator per person Intelligent Chesa lies on a table awaiting its oext challenger, who or which may be beginner, expert, or schizophrenically, itself.

Moves are shown either on the

digital display, or if linked to a TV, on the screen: IC makes one checking the legality of your moves and pointing out the atrengths and weaknesses of your

stop chess - if the family will let

When this palls, the Home En-tertainment Centre offers 14 TV games including Combai, Maze, Horse Racing, Motor Racing and Master Mind, the latter going supersonic to become a game on its

Instead of manual four-coloured pega, a sequence of aix numbers tions and is stored on a chip.

One person or many may play and you can race time to beat the clock. Again you are judged au-dibly, with a buzzer for failure and a bleep when you win. No hope of hiding the buzz of failure.

minded, a good six feet of living room could be given up to the Hornby Model Railway System incorporating the Zero 1 Power

Chips with everything

This awesome-sounding facility vests control in each loco rather than the conventional track, so complex racing bets. that up to 15 trains can be independently controlled by the province of highly-trained profes-sional "settlers", but even inexpememory unit. It contains an ioertia control mechanism to simulate the rienced staff or punters can use realiatically savage atop and sort of

The Study is more serious. The British Telecom viewdata system Preatel dominates the desk, a ZX80 may hold the household accounts and an X-Press Callmaker telephone functions either as

It stands ready to atore up to 10

break down.
The Sensamatie tumble dryer which may be dialled by presaing iust two buttons.

If there's a gambling man in the capitalises rather eleverly on the house, Genie may rub shoulders fact that exhaust air temperature with a lamp or two in the corner remains steady while the washing is wet but shoots up as soon as it losses. It is a single chip micru for calculating the winnings from

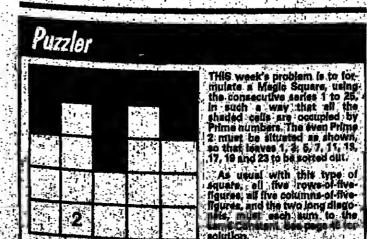
The general temperature is maintained by a self-learning Cen-tral Heating Controller, which teaches itself to save your fuel bill. Previously, thia was the sole Hot water and room temperature

The chip has becume more orna From the sublime to the rigomental in the bedroom with flashrous, the workaday world of the ing electronic jewellery winking kitelien is not forgotten: it comes out messages or colours.

A pocket TV sita on the bedside a built-in Couture de-Luxe Wall table and is just the right normal Oven with computerised timer and reading distance away for its 2in Creda 1000 RS Electronic washing screen to give a bright sharp pie-

Course at KBS Computer Services, Liverpool, which hopefully will improve het changes of employment in an area where 4,700 school-leavers chase only 12 lobs.

CHIEF OPERATOR Bill Jones Instructs Aldeen Veste, 18, of Runcorn, on an IBM 4831, She is one of the students on a 14-week Youth Opportunities





DEC PRICES SLASHED



VT100 DECSCOPE 80/132 column VDU with detachable keyboard smooth scrolling, split-screen, and video

input/output.

RAIR 30-32 Neal Street, London WC2 Tel 01-836 4663

PEOPLE and EVENTS

Omnidata names management team

THE UK company formed to market the Omnidata range of combined data and word processing systems, Omni-data Ltd, has made four management

Appointments.

Managing director is Christopher Geer, an Oxford University graduate who spent the first ten years of his DP career with IBM. He also spent several years or mining sales management extensions. years gaining sales management experience with Case, Extel and Sperry Univac and most recently served as director of Europesn aperations at

Microdats International.

David Warren joins the company as sales director. His recent experience in the industry has included a spell as soles manager with Data Recall,

nerly systems consultant to the Port of

John Marsh has been promoted to marketing director of Maror New Technology. He was formerly senior

Graeme Kyle has been appointed director of business systems at the Motor Agents Association. He was for-

Mike Bradford has left Inmos to join Dicoll Data Systems, as technical support apecialist with responsibility for UCSD-Pascal.

national sales manager of what is now called CPT (UK), and a brief period working as sales director at the now defuner Supertyper Company.

Technical manager Ruanid Hale left the Royal Navy and joined ICL in 1960 as field engineer. After four years with Datasaah, he joined Data 100 as senior engineer.

engineer.
Roger Woollett has been named software manager. A graduate of Loodon University, be worked at GEC Hirst Research Centre for seven years researching microwave tubes. He worked as head of the London University Computer Centre's advisory sersty Computer Centre's advisory service and gained his commercial experience with Nixdorf and Data 100.

Robert Hint has been appointed director of semiconductor memories at ITT Semiconductors. He will continue in his present role as plant manager at the company's Funts Cray division.

Jackle Shearer joins as sales support manager, and will be working with two newly appointed sales support consul-tants Garry Parsons and Poter Best-Neil Dempsey has been promoted from vice-president of sales to vice-president of marketing at Harris Corp's

clive Taylor is project manager for the company, and controller of budgets and business planning is Adrien Pleree. He was previously senior pro-ject planner in the East Sussex County Engineer's Department of Grand Metropolitan Richard Pitt has been appointed senior analyst at Zygal. He was formerly an analyst/pungrammer on Honeywell Level 6 machinea.



Grand Met

appointments

SEVERAL management and sales ap-pointments have been made at systems and software house Grand Metropoli-tan Systems Ltd (GMSI)

Harold Gilmour has been appointed development director, responsible for systems development. Alan Glover, previously marketing and development director has been appointed marketing director.

David Smith has been appointed ter-titory manager, Wordcom systems at Interscan. He previously held appoint-ments with Kalle Infotee and General Audio and Data Communications. Also laining the







Yvonne Thomas, George Greene and John Levy have been appointed consultants at Package Programs Ltd (PPL). Thamas joins from Computerplan where she was training and support manager. Greene has been twooling his man commitment for the past two years and Levy spent the last three years with IAL Gemini. Managing director at STL

A MANAGING director has been appointed or Standard Telecommunication Laboratories (STL), the Brhish research centre of ITI. He is Dr John Shields, who has been with the connant for the page.

pany for ten years.

De Shields holds a PhD in nuclear physics from Glasgow University and is a member of the Institute of Electrical Engineers, and the Institute of Physics.

Until his recent promotion, he was general technical director of ITT Europe based in Brussels. He has also been acting managing director of STI oining the company is Linda Jeffrey. She is responsible for sales support, joining the company from Britania Computer Systems. en acting managing director of STL.

John Patterson and Trevoe Lefferty
have been appointed directors of
Nexos. Patterson joined the company
as national sales manager last year and
is now sales director. Lafferty, formerly national services manager with
the company is now field service director. Richard Clark has joined Marcus ohn Associates as a senior consultant.

David Longley has joined Harris Systems as marketing manager for the company's DDP display terminals and mints. He was formerly marketing support manager with Data 100.

Liveware File

I LITTLE THOUGHT.

THE DAY I PASSED.

South Bank Poly computing principal dies

PRINCIPAL lectures in company of South Bank Polytechnic, (Learn Gareth Pugh has died at the spade After national service at a shortion officer in the RAF, Pugh ideal the staff of the Polytechnic in 196 During his service there, his today increase moved through nominal stally is to computing, proposing principal lecturer in 1969, with the mouth spell as acting head of deat ment.

nionth spell as acting head of dear niont.

He contributed to the development of courses in the part of the computer at the computer at the computer at the computer acting and in Prigh served as an elected member the Academic Board for several and the also chaired several ILEA (fact London Educadon Authority) consister management committee.

Guy Philips has joined the Telescessing Computer Centre is at executive. He gained experience is minicomputer and bureau substate Burroughs and GSI.

Frank Chambers has been united managing director of Specialing. He was formerly with better hand has separt ten year in the life doubtry.

... MY PROGRAMMER

APTITUDE TEST.

New blood gives triple boost to **UK** minimakers

By the end of the Seventies the three were still small - and still just getting off the ground. Their combined turnover was barely over £10 million.

But the companies have sud-denly not only taken off, but are beading, if not for the stars, then at least beyood the clouds.

The three are different in their markets and levels of financial backing. What they have in com-mon is that new blood has come in at the top, bringing cotrepre-neurial spirit and a vision of the future to CTL, a new structure to Digico and a clean sweep to Allied Business Systems, now ABS Com-

Tony Davies is the new man at CTL. He has an talenting background but enjoys the marketing and financial aspects of running a company. Experience in these matters was gained at Membrain, the submersion. the sutomatic test equipment manufacturer be formed to make his own system. He sold the com-pany to Schlumberger in the late Seveoties.

Davies is now head of Information Technology, formed as a programmer.

Ken Atkinson, who arrived as marketing director in 1976 from Wang. He is now managing director of Spanverne Investments, the bolding company for Digico and its new associate companies in Its new associate companies in maintenance, rentals, supplies and

THE independent UK mini-

computer manufacturers, ABS

Computers, Computer Tech-

nology and Digico, progressed

at snail's pace through the

Seventles. But new blood at the

Eight years ago there were 250 programmers losing the company £70,000 a month. Now there are six and they're profitable.

Davies got involved at the same time, widening CTL's scope with training, consultancy ing services.

plans for new companies.

Digico's early successes were also in the scientific and process John Elsden, managing director at ABS, is the odd ooe out. He has control fields. But by the mid-Seventies the minicomputer world been with the company since its

holding group for CTL and for planned new ventures. The first is Office Technology, which is design products for the sutomated office market.

A bolding group for CTL and for planned new ventures. The first is office Technology, which is developing products for the sutomated office market.

A bolding group for CTL and for right sort of people coming in at the right time. CTL and Digico have been srchetypal UK companies. They were formed by technical people with minicomputers of their own design, which have since become pretty well respected.

was changing and a vast market for

top of each company has

brought great hopes for the

future. Computer Weekly talks

to the new men and finds out

why the companies could be

ready to make an impact.

US processor with what was then a unique two-bus design, which ABS now builds in the UK. But Enterprise Board's microthe system was oversold, leading to electronics veoture, Inmos. He was backed by merchant banks cash flow problems. ABS was taken over by the massive Trafalgar House group. and investment companies. But be was a technology man, so during the early Seventies a commercia managing director was brought in. CTL could not take the costs of an CTL could not take the costs of an expanding sales operation and another managing director arrived to cut costs. He turned the company round for Bob Finch, the present managing director, a long-serving CTL man.

Finch cootinued to put emphasis on commercial systems, as opposed to CTL's traditional mixture of Francisca, and beorget in David Fear, formerly managing director of Prime Computer in the UK, as marketing manager. Davies got involved at the same

sive Trafalgar House group. Elsden was made managing director to put things right. "In the past the company had been run by entrepreneurs," he says. "I'm the first managing director who understands the products from the technical angle."

Elsden bought full manufacturing rights to the processor to give ABS 100% protection for its product and then set about the comduct and then set about the company with a broom.
"I've put to bed some of the

small businesa aystems was

opening up. That was when Atkin-

started by an entrepreneur who saw a future for minicomputers in

the business market. He found a

"I've put to bed some of the things that kept us mouth; things like overstocking and special deals," be says.

"The applications programming team has been trimmed. Right years ago there were 250 programmers losing the company £70,000 a month. Now, there are six—and they're profitable.

"When I took over we had seven

When I took over we had seven

salesmen, who reported directly to the managing director. I've



JOHN ELSDEN, ABS Computers: "I'm the first managing director who understande the products from the technical angle." Technology: "What we've got to do now is get off our backsides

brought in an experienced sales director and we're working to-wards 32 sales people and extra sales offices."

son was brought in.

At ABS things happened in reverse order. The company was Alcohol has been banned from the offices; even visitors are offered lemonade or orange juice:
"We had a bit of a drink problem
with some staff,"

Some people have reacted by leaving, but Elsdeo believes the company is alrooger for that: "People who are doing their fair share doo't like to carry passeog-ers. Besides, we can't afford

directly to users, Digico depends on systems houses. And Atkinson has taken Digico to extraordinary lengths to make it structive to ose companies. Discounts are now based on pro-

jected turnover rather than on the number of systems ordered; if s systems house expects £100,000 of nisiness in a year it gets a discount based on that figure. If it does \$200,000 of business in the first quarter, the discount for the rest of

the year is based on business worth £400,000. Prices are structured even further to reduce the risk to systems houses. We've looked st the risk areas and charge accordingly," anys Atkinson. "For example, an OEM can get 32K of memory from us for just £1,000. So when he's sizing a system he

KEN ATKINSON, Digito: "A young OEM con coma to us and get a sensible deal."

can be wrong by 32K and still no risk too much money."
Digico offers free use of its put

relations services, including mail shots, advertising expertise exhibition display equipment are brochure design and printing.

Digiço tries to meet its systems houses once a month to review their progress and give advice needed. "We never try to run the companies for them or probe in their balance sheets," says Atkin son. "We help, but if they can survive, that's their business."

There are sound business Wblle ABS and CTL sell reasons for this apparent benevo-lence: "A young OEM can come to us and get a sensible deal. And w get sales withour hassle. We're hardware manufacturer, oot

turnkey systems supplier."

Digico's expansion into other areas was financed by the sale of 15% of the company to four investment organisations. That deal raised £500,000 and was organised by the merchant bank, Robert leming, which is also sponsoring a planned share quotatioo on the Stock Exchange. Digico's new se sociate companies are independe of each other, reporting to Spanverne Investments board.

The three UK minicomp ifacturers are now all ready i next step for all three: we've got to do now is get off or backsides and sell the products."

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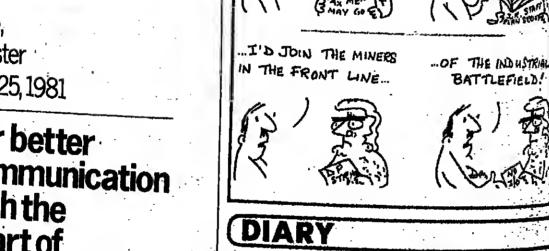


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EBRUARY 12

NOMAD. BCS Advanced Programming Group. Prudential Assurance Co. Holborn Bars, London. Details Peter Prows., Birkbeck College, Tel: 01-580

Half-day visit to Northwick Park, Harrow. BCS Medical groups. System X and its software. BCS Ox-ford sub-branch. Staff Coffee Lounge, Oxford Polytechnic, 7.45. FEBRUARY 13

Annual dinner dance. BCS Belfart branch. Culloden Hotel, Belfart, 8.00. FEBRUARY 16

Acquisition and retention of computer personnel. BCS Cheltenham and Glos branch: Queens Hotel, Cheltenham. 7.30.

Microprocessors. BCS Glasgow branch. The Music Room, Staff Cinb. University of Strathchyde, John Street. 7.00.

FEBRUARY 17

Social evening. BCS Chester and North Wales branch. Greenall Whitey, Warrington. 7.30. Details A. Bewley, Holly Cottage, The Common,

FEBRUARY 18 Data communications in the Eight ten IDPM Central Lendon branch. Pearl and Deas Studie, 19 Broadwick Street, London W1.5.00

Joint meeting of BCS Selfan branch and Uniter Seciety of Charmend Accountains. London, Holder, Beiling, 7.30

training. BCS Leeds branch. Parter Hotel, Leeds. 6.30. Computers in the energy inform. BCS Sussex branch. County in Lewes, East Sussex. 7.30. FEBRUARY 19

A

Careers in computing BCS the deen branch. College of Comment. Holburn Street, Aberdess. 7.10.

Joint meeting of BGS Corest branch and BPICS BARPICS of BLIBM Midlands Marketing September Warwick. 7.30. Nonern limited, so apply to Cong Gert's Coventry 72745.

Stonebenge megalithic market.

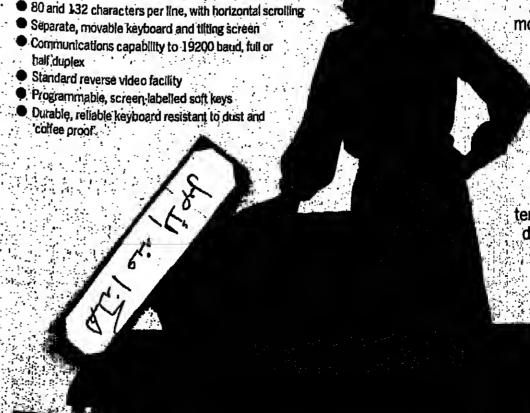
nonsense? BCS (mides Suite, Lynchford Road, Farebook 7.30. Meeting BCS Locden Brack dorf Hotel, Aldwych, 6,001

FRERUARY 25

Microprocessors and application.
IDPM Norfolk branch. Case here
Norwick, 7.45.
Word Processing a new fit
year of experience. IDPM Stelles
branch: Sheffield Twist Drill Conference. Sheffield Twist Drill Conference.

PERRITARY 26 SCERT - Semination of Description of DPM-Based break County Hotel Cheleston

TAB 132/15 DISPLAY TERMINAL High resolution, 15ins screen, green or white phosphor



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Valid or invalid?

invalid

16 and over

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Divorced

and Over 16

This, sf course, simplifies validation considerably and is in some cases the only solution, where

system has to be developed in

short space of time and elaborat

validation routines cannot be de

It can, however, make proces

igned in the time available.

sing much more complex, since

processing in dependent on th

ingle event entity sub-types whic

havs made up the state, the comb

nation has to be unravelled into

constituent parts every tim

processing is required on them. In the long run, it is usuall

to design exhaustive validation

routines rather than design comb

eribe concisely the precedence of

events and functions in which th

entity is involved, and the atate

which the entity must be befor

that event/function can occur.

Entity life cycle diagrams des

nation "state" codes.

THE paperless office of the future could become a practical reality if new ways for unskilled staff to interact with a computer, thought up at Imperial College, London, come

Two researchers at the College have designed ao electronic office which they call Panorama and for which they are now seeking development funds from industry, for the building of a prototype.

Bi-focal

Lecturers Robert Spence and Mark Apperley are concerned to overcome the reluctance of profesboards, and to make it easier to keep track of large numbers of documents held in an electronic store. To do this they eovisage an office using a specially designed bioffice using a specially designed bi-focal screen, aimple voice holding a wand or having a small recognition, and a wall acting as a visual index.

None of the Panorama ideas has yet been implemented, but they have been simulated in a videotape with which Spence and Apperley hope to convince a UK firm interested in office systems to fund a project, costing possibly £20,000, by which the ideas could be tested.

The purpose of the bi-focal scans a large number of pages on a normal-size screen, likened by Ap-

would appear squeezed to a small size, but in which their headings and colours would be visible. Is this way, several documents in view could be identified but out read; for reading they would be scrolled into the central area where they would appear full size.

Implementing this would require only some special hardware in between the memory and the tube, said Apperley. The acreen would be touch-sensitive to enable the user to aelect options, expand aod shrink graphs, and so on.

To have a wide range of func-tions and files that can be called up with no need for a special command language, Specce and Apperley envisage the wall of the office being covered with labels or pictures, about 100 maximum, to which the user simply points for whetever he wants to do. The whatever he wants to do. The pointing would probably be sensed unit incorporated in, say a cuff-link. A spot of light would be feedback to where he was

Pictures

The electromagnetic sensing would use coils in the same way as Perrantl's gun-aiming unit is built into a fighter pilot's helmet: the pilot simply turns his head to the

periey to trying to read The Times through a keyhole. To solve this, a screen would be divided into a central, normal area, and two areas on either side in which documents either side in which documents projected from a computer-

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bigger brother.

commands would be given to the system via a limited-vocabulary voice recognition device, and any text, such as notes to be added to dscuments, would be fed in on a handprint tablet.

Audio dictation

Spence and Apperley assume most document creation will be by audio dictation; the secretary the oext room bas a keyboard. Ir coming paper would all be held as video images, necessarily video images, necessarily taking up a lot of store. This, and the oeed for band-indexing such video documents are two of the main question marks over the practicalty of the aystem, which needs to

be tested on a prototype.

Panorama has the advantage that little change has to be made in the appearance of the office something to which managers are sensitive. It is ease of use and the lack of a command language that Spence and Apperley are concentrating on; they are not concerned at the moment with information

retrieval strategies.

Their problem now is that the aborate access devices are not necessary until a large database is there to be used, but until the system is working there is no ln-

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readable information is concealed The government claims that the only information on the card is visible in the letters which give the on demand. centive to construct the database. There is little doubt that the hardware would work as the Impeholder's identity and the card's number alongside bia photograph rial people envisage; it is systems problems that need to be tackled, to find out whether the new and signature.

The Commission has sent a techniques are easy to use in

> outskirts of Paris to visit the first of six planned factories which will produce the oew cards. Commission director Louis Joinet told me, "I do not want to guess what their findings will be when they produce their report, but I have confidence in the apecialists in the data processing

team of experts to Levallois on the

FRANCE'S National Commission

or Computer Technology and

Liberty is awaiting the result of

tests by experts to determine

whether the government is telling the truth and nothing but the truth

about its new computer-produced

identity cards.
The Commission's specialists

are examining the cards closely to see whether any secret machine-

The government claims that the ideotity cards and the resideoce permits issued to France's four million foreign residents are not ushering in George Orwell'a 1984 era of "Big Brother" esvesdrop-

industry who are working on our behalf."

cards worry the French But director Joinet said: "Of course, it would be possible fur the Commission's experts to give the new cards s clenn bill of health and for the authorities to modify them later. After all, the pensi code forbids theft, but thieves ore at wark

Robart Spence demonstrates his mosk-up of a toush-senaltive bi-focal acrean for the paperiess office dis-future. Saverel documents could be shown on the assean at once by compressing these at the sides.

Computer-produced identity

Almost simultaneously with the issue of the first new cards to residents in the sunthern Ports auburbs, the government has puh-lished decrees which bring into force a new Bill which will increase the powers of the police to require the presentation of identity cards

Denial

The government admits that it has a central file of information about foreigners which is being fed into a databank. But it denics it is setting up a centrally computerised record of French citizens.

The new plastic yellow-orange card measures 8.9 centimetres hy 12.5em. It iocorporates a five-pattern engraved pattern by a compu-ter which makes it impossible to reproduce without complex equip-

ment. The signature and photo are reproduced by laser digitally.
Introduction of the new card has not been the subject of a formal Parliamentary debate. But the government claims that It has taken heed of the recommendations of

ter Christian Bonnet's ultimated lective is heightened by the pr the codes "ID" (for identify al

"I'" for French ostionality.

The Interior Ministry sais that the innovatios will prombh u valuable instrument in the fet against criminals using high ducumeots.

The argument that the per & The argument to democratic upheld by organisations include former World War II resume fighters and Jews who survived Nazl occupation thanks to logi-

identity papers.

Stressing the need to pass
criminals using aliases that a furged documents, the policems that when Prance's Public East No I, Jacques Mesrine, we let in a police ambush in 1979, 4 found 37 Identity cards - all in liant Imitations - on his bet

riddled body.
Lionel Stoleru, France't Her for Immigrant Worker, av. "The new optically readable in tity card is absolutely indipart ble to enable us to manage m huge foreign labour force."

Iouroduction of the card in enable the government to be ment a plan which it has long be ment, which now exceeds 1.6m lion, it intends to get rid of 40%

Infotech goes into liquidation

was manoeuvred off the board. was manoeuvred off the board.

Inforcch was hit again at the beginning of this year by what Wilkins describes as "disagreements among shareholders."

On January 8 John Biske, former sales director, was handed a sale and share out of the halfeld.

a writ and shown out of the building.

When confected Blake refused to make any comment office. Infotech Ltd issued the writ a dust power base developed with Goodman sending round a letter in support of Blake and try-

ing at one stage to pass his voting rights to Blake.
Lined up against Blake and Goodman were Wilkins, plus mansaing director Chris Boon and product director Keith Robinson.
Blake has remained near to Infotech since his dismissal because tech since his dismissal because

tech employees to discuss, he affi the possibility for continued parts of Inforech.

Goodman, who was informed company and I talked with an Blake in an attempt to reput controlling interest.

He continued: "It's a inember to the next two weeks will set serious attempt to reflect paid the company. I will not be liquidation follow in course.

Call for UK systems university

A NEW indiversity devoted solely to insching companing and isseed communications will be a supersity of foreign students.

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Documenting the entity life cycle

Section I — Part 17 life cycles was intraduced as a method of documenting the "life" of an entity as scen by the busi-

In the example shown in Figure

There should only be one start

The final state is represented by

The event "Booking" inliners

The advantage of entity life cy-

the entity's life, ie creates the en-

tity. Thereafter, the appointment

and then archived.

ness, by examining all the events which affected the cutity. of our series describing a system The first two steps in drawing design methodology entity life cycles were described summarising the elementary func-tions' use of enuty types, and deby Rosemary Rock-Evans

ciding which entity types merited This week, the next two ateps in drawing entity life cycles are described; determining the valid, states of an entity, and drawing the

entity life cycle disgram.

1. The states of an entity type. l, each state is a direct result of In earlier articles the coocept of entity sub-types was described. Entity sub-types are mutually exclusive grsupa of entitlea within the sne entity type, eg. "Male" or "Female"; "Married" or "Not

The "state" of an entity type is simply a combination of eveni-driven entity sub-types, eg "Married Parent", "Single Parent". Only eventa which meet the following two criteria are used to determine

has altered the entity's state. a) The eyent roust alter the value or values of an attribute or attripoint on the diagram. Where the butes of ao entity, or the relationship(s) with other entities. state of an entity has not changed despite a function acting upoo it, b) Subsequent events must in eg "Doctor's Inquiry", an invo-luted arrow is used. some way be dependent for their occurrence on the event being atu-died. In other words, if absolutely a double circle. This state is often anything can happen after an event, it is oot useful to consider it when "Archived" In Figure 3, the entity life cycle diagram for an appointment is

determining atates. Thus, for example, an inquir into the health of a patient would not cause a change of state. In most cases the valid states o

ao cotity type cso be seen fairly easily without the cruity type being studied io too much depth.

an appointment might be "booked", "kept", "broken", "cancelled" or "archived".

sent pictorially all the important elementary functions in which an entity is involved — something entity is involved - something which is not possible, for instance, with structure diagrams (the diagrams used in structured program-

. Drawing entity lifs cycles. ming). Even so, in some cases the dia-In order to draw entity life cy-clea, the grid produced in the first gram becomes so complex that it is stages of entity life cycle analysis is used to identify the eventa which not worth drawing. In this event only the entity life cycle matrix (described in the following article) In Figure 2, the conventions for ia worth completing. (The entity drawing entity life cyclea are shown. The initiating event is life cycle matrix cootains all the events and functions which affect shown by a large arrow, and thereafter a single-line arrow is

the functions which cause a change of atate in the entity life cycle dia-

Drawiog an entity life cycle where the eveots produce mutually exclusive statea is fairly arise, however, if the states produced by events occur at the same time, for example, a person can be both married and a parent at the

In our previous example, we chose states which could not exist aimultaneoualy; an Appointment cannot be "Booked" and "Broken" at the same time, or "Kept' and "Cancelled", one of these

states cancels out the other.

Married, single, Divorced, widowed set of munually exclusive groups.

For example: If we consider the Patient, the groups of states may

 Referred Diacharged

Archived

Married

None of the states can exist

It is not always obvious however, whether the correct grouping has been chosen to get exclusivity. For example, the states "Under 16" and "Married" are invalid if found together, hence there is dependence between Group 2 and Group 3.

To ensure that the correct mutually exclusive groups of states have been chosen, a device called the valid state diagram is used. The Patient entity type will be

used to illustrate the use of valid 3.1. Steps in determining the velid states of an entity type.

i. From the grid produced in the

first stages of entity life cycle analysia, identify the events which affect the entity, removing those which do not change attributes or relationships, or affect subsequent

ii. Group the events together where it is immediately obvisus that they cannot happen in paralle produce states that occur concur-

groups listed in columns. An

under 16 valjd single divsrced under 16 under 16 valld sver 16 Figura 1. Valid state diagram. are valid in combination with all

sther groups. The number of cumbinations to check is calculated by multiplying the number of subtypes in each column heading Single Une.g. in sur example there are 2 x 4 8 combinations to check.
 iv. Identify the valid and invalid Married

combinations.
v. Allscate a "common state name" to the valid combinations. vi. Use the common state names

COMMON STATE NAME

Single ehild

way dependent, an entity life cycle is then drawn for each group. In our example the patient entity type would have had two entity life cyclca drawn, one for the referred. discharged, admitted, archived cycle and the other for the valid states shown in Figure 1.

Further points

. In the article on entity sub-types it was stated that these are usually disunguished by the values of at-tributes. In the Patient example, the following aub-types might have been represented by the attribute values shown in Figure 4.

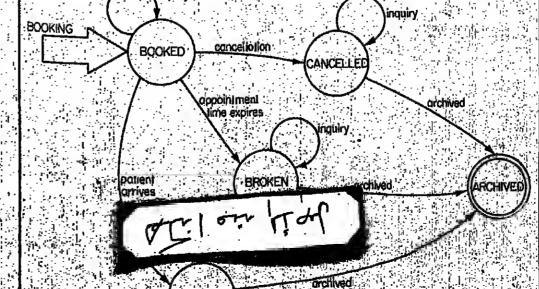
It is not necommon, however, for a computer system to force the user into providing only valid states for entity types. This occurs when the systems analyst allocates

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The Data Analysis methodolo was developed at CACI by Ist Palmer.

ENTITY SUB-ATTRIBUTE A valid date Date of death A valid date Date of birth

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lgure 2, Conventions for entity life cycles.

Public procurement policies may hamstring the UK industry

THE UK computer industry has always been hampered by the lack. of an appropriate government policy. The newo that a Ministry of Information Technology was to be set up was therefore particularly welcome. That happened last November; the ministerial re-shuffle in January improved the

Firstly, the new Minister, Kenocth Baker, has had a long association with the industry and is familiar with its problems. Secondly, portfolios were reorganised, so that for the first time one man had responsibility for the distinct but even more closely related areas of comms, microelectronics, robotics and public procurement.

In the same month, the reconsti-tuted Electronics Economic Development Committee (EDC) held its first meeting. The chairman, Sir Henry Chilver, has made it clear that the existence of this committee symbolises a change of em-phasis from the detailed investigations of the sector working parties, to a more fundamental search for an effective strategy for the indus-

the influence trist the commit-tee will have can be gauged from the list of members, which in-cludes Chris Wilson (ICL), Sir William Barlow (Thorn-EMI), Sir Kenneth Corfield (STC), James Merriman (NCC) and Des Pitcher

Merriman (NCC) and Des Pitcher (Plessey).

These developments must have implanted fresh hope in the breasts of all those who believe that a strong UK computer industry is sink into the boots for two reasons.

Eirstly, it suggests that the animated in the strong of the believe that a sink into the boots for two reasons.

Eirstly, it suggests that the animated in the strong of the strong of the proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components with an increasing proportion of its electronic equipment and components, with an increasing proportion of its electronic equipment and components are proportion of its electronic equipment and components with a strong proportion of its electronic equipment and components are propo

The setting up of the Ministry of information Technology, and the first meeting of the new-look Electronics Economic Development Committee, brought fresh hope for the future of the UK computer industry. But the preferentiel procurement policy which the EDC may operate could prove a hindrence to development. This erticle looks at why the industry has suffered in the past and examinee the problems presented by a policy which is now illegel under EEC lew.

tion bas been decided upon before



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vital to the future strategic and economic health of this country. Which made it all the more disappointing to see it reported that there would be "no large financial handouts, though considerable belp could be given through a pub-lic purchasing policy" (CW, Jan-

demand of the market and then the degree to which our indigenous nduatry is capable of meeting it, before the nature of the remedie can be specified

Secondly, the statement quoted is a fairly accurate summory of the olution adopted over the past 10 years. And if there is one thing that-everybody is agreed upon, It is that government action over that period has been totally inadequate.

Single tender

Let's forget the question of handouts for the moment. Quite why an industry with so much po-tential should be denied handouts, when a lame duck like British Ley-land was given £990 million, and, earlier, s technological white ele-phant like Concorde consumed public money to the tune of 10 digits of pounds sterling, is difficult to understand. But the main question I wish to raise is about the desirability of a preferential

We had one of those right up to December 31 isst year. It was known as the single tender policy, and it provided that for computer systems over a certain size, government bodies bad to purchase from s British supplier. In practice, that meant purchasing from ICL.

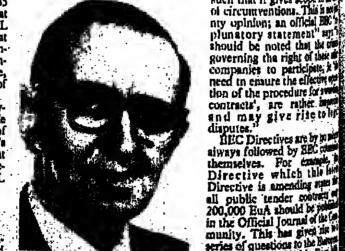
lem is obvious. The UK is import-This policy was unsatisfactory ing an increasing proportion of lta for a number of reasons. In the first place, it gave ICL very little halp, and the rest of the industry none at all. For the past three years or so it accounted for about five per cent of ICL's turnover. In tha business would have gone to ICL anyway; much of it was repeat business, and the industry standard for retaining existing customers is 80 per cent and in any case, ICL usually gets about a third of all UK mainframe sales.

So, being generous to the gov ernment, it can be said that single tender accounted for £20 million of ICL's business last year. That's not £20 million profit; to get that money ICL bad to supply and deliver goods. The real value to ICL is therefore minimal.

On the cheap

The policy had several unplea-sant side effects. It encouraged complacency within ICL; with the best will in the world, you are not going to put so much effort into a contract you know is secure, as you would put into one you are competing for. It also aroused re-sentment among users; nobody likes being told what to do. Added to this it gave a hammer

to ICL's competitors; they get as much mileage out of attacking



some other document; indeed, the Directive itself is an amendment to

After some time spent in hard study, I found that the purpose of the Directive "is to establish an international framework uf bal-

anced rights and obligations with

respect to government procure-

ment, with a view to schleving liberalisation ond expansion of wild trada." One could be forgiven for thinking that this runs

totally contrary to the objective of

the BEC as a whule, which is to further the interests of the Com-

munity members (ian't it?).

explanation

apparent anomaly can be found in one of the documents to which the Directive refers, which states that "the aim of the Commission's batween the Community and oblique reference to this posts of previous paragraph is thus this Directive will have it is sampled in the provided as a GATT objective,

much mileage out of attacking study tender as they would had the vicinity and per nearly subsidised. The manzed at how many computer professionals I meet who think that ICL is subsidised.

Finally, it encouraged government to think it was doing something when in fact it was doing something when in fact it was doing anticons which had been southing; it's a policy on the case.

All of which makes the fact that the study is appeared to follow certain trading practices with a view to meeting the objective, and of like Directive and fact that the final threshold in fact it was doing something when in fact it was doing something when in fact it was doing to this agreement and therefore relating the object in the study became the super became the super thing the super policy as a possible object in a very well be well as the process of the US as a signatory to GATT.

Some processing in the super to the super policy are a possible to the super policy as a possible object in a very became the theorem bound in the light of the examination of the companies.

The consequences are not so object in the super policy as a possible object in the super policy as a superior of the US as a signatory to GATT.

Some processing in the amount of the consequences are not so object in the super policy as a possible object in the super policy as a possible of the US as a signatory to GATT.

Some processing are the cities of the super policy as a possible of the super policy as a super policy and policy of the super policy as a super policy as a possible of the super policy as a possible of the super policy and policy and policy as a super policy as a possible of the super policy and policy as a super policy as a possible of the super policy and policy and policy and policy and policy and policy and polic

ICL choirmon Choppail... "Wa regrat the lock of progress matters the past year towardo adopting a Europaon public sector processes and support strategy." ing experience. The turgidity of the prose makes an ordinary legal document look like a masterpiece a position of equality a first of lucidity. The whole of the first lic tenders are concerned, the page and some of the second of the three-page document is taken up with clauses beginning "whereos". Every other sentence refers you to

The wording of the Direct

such that it gives scope was

nty opinion; an official BEC

plunatory statement spile should be noted that he of governing the right of there

companies to participate k

Road, W. Drayton UB7 9BE, Tel. No: 08954 40651. them a positive advantage.
All of which makes Philip() STRUCTURED Cobol for Data pell's comment in ICL's Processing is obviously a book writtee with beginners in mind report, that "we regret the bil progress made during the per-towards adopting a Europeup and Normao Lyons opens with brief notes on the growing impor-tance of computers. He follows with basic information on prostrategy," look like the miles gramming languages, data processing vocabulary and symbols in a Turning to my second in how can anybody think in ten

illustrated chapter. . The author's approach to Cobol is to start with the Procedure Divia procurement policy in it is of this Directive? The point plies only to contracts with insion, thus coabling the student to write simple programs from an early stage. Inevitably, many rules in excess of 200,000 lime units of account (£130,000)s have to be mastered in close succession but these are clarified by sive of VAT; preferential per ing is perfectly permissible appropriate diagrama or examples.

Chapters 3 to 5 cover sorting, arithmetic and conditiona. Lyons tackles the SORT statement earlier than many manual-writers because of its essential part in so many ystema and leaves the discussion of number systems - sometimes a very early topic — until chapter 6.
Chapters 7 and 8 introduce the student to the Identification, Environment and Data Divisions, thus allowing the chapter of the Identification, thus allowing the chapter of the Identification, the Identification of the Identifica

BOOK REVIEWS

Software Configuration Management by Edward H. Bersoff, Vila D. Henderson and Stanley G. Siegel. 385pp. Prentice-Hall International, London.

ANY book which addresses interests rang-

ing from pocket calculators like the TI-59 of

P-41C, minicomputers auch as the PDP-

li and large-scale systems like IBM 370 and

Cray 1 array processors, deserves more than

The work under review suffers several

disadvantages from a European reader's standpoint as it was obviously directed to-

casual interest within the industry.

Processing, by Norman Lyons. 326pp. £6.50. Glencoe Publishing Co Inc, 17337 Veotura Boulevard, Bncino, California.

British publisher: Collier Mac-

Millan, Stockley Close, Stockley

allowing him to write complete programa rather than relying on the atandard divisions supplied

input and output, file organisation and the PERFORM otatemeot.

to those who have not only an extensive knowledge of Cobol but also considerable experience in its available only in the separate in-The index, appendices and mar-gin notes make finding informa-

This book will appeal most of all

The theme the authors emphasise is disci- without the benefit of a map, given time,

Charting the route for software use

There are some dated references to the

late 1960s and it is the combined work of three authors. The book also requires knowledge of basic algebraic concepts and carries the by-now obligatory quota of exer-

It is a credit to all concerned - not least

the subject matter - that the book survives

as an impressive piece of work despite these

tion easy. The book is thus a sound introduction for the beginner and

test the student's understanding

but it is a pity that the answers are

Two approaches

to Cobol work

structor's manual.

A Programmer's Guide to Cobol, by William J. Harrison. 232pp. £14.20. Van Nostrand Rein-hold, 135 West 50th Street, New York, NY 16020. British publisher: Van Nostrand Rein-hold Co Ltd, Molly Millars Lane, Wokingham, Berkshire. PROGRAMMER'S Guide

Harriaon makes it quite clear tha the reader will need to have a fairly extensive knowledge of Cobol if he is to benefit. Furthermore, he is not attempt

ing to teach the syotax of Cobe but rather to show how it can b used to the best advantage

The author takes the precaution of including an appendix giving an outline of the basic rules of Cobol for those who need to revise them. His first two chapters also in

processing and language atructure.
The remaining 13 chapters take OPEN and CLOSE atatements, a review of fundamental procedures, and anudy the features of Cobol that are not always used to

Each tople is treated indepen-

Harrison attempts to keep his comments machine independent

Database design

software products, and the methodology inurney is accomplished on time and minus known as Software Configuration Manage-

Databose - Structured Tachniques for Design, Performance and Macagement by S. Atre. 442 pp. John Wiley and Sons. aries, data modelling, database de-sign, database implementation and performance problems, this book provides a useful and well presen-

Anyone wishing to develop his or her knowledge about softwore and the art of

development management would be at home with thio volume. For those who are uncer-

tain about the concept of SCM, the authors

suggest an apt analogy between the

One may arrive at the chosen destination

It includes and exemplifies the hierarchical, network and inverted

ed theoretical review of the whole

for anyone studying databases and their design.

Dotabase administration is ex-

the author's personal experience.

Nevertheless, the book io suitable

The key to SCM oppears to be identifica-

on, and getting the bosic labelling correct

senior position for this function. A. J. THOMAS

iminates many subsequent problems.
At the same time, rival publishers should take note of the general presentation. The book is well and interestingly written,

The ZX80 Pocket Book, by Tre-vor Toms. 128pp. £4.95 inc. p&p. Phipps Associates, 3 Downs Avenue, Epsom, Surrey.

Making

Perhaps this is only what is to be expected in a book subtitled An Investment in Pro-IN a relatively short time, the ZX80 personal microcomputer has become well known to the public Trevor Toms attempts to expand the knowledge of its present user nd the potential market.

Although not intended for the absolute beginner, the hook reviews the ZX80 Basic, giving hists and examples for its efficient use, and highlights some of the incon-The basic approach to database management aystems is based on 1BM-compatible systems, due to

On the book 1K RAM system program size is obviously critical. Useful hints and examples are proained fully, and the author en- and minimal use of REM statesages a comprehensive and very nior position for this function.

BARRY FISHER



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ready for the electronic future. Plete network.

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disputes." REC Directives are by proaiways followed by EEC comthemselves. For example, in Directive which this has Directive is amending man a all public tender content at 200,000 EuA should be possible in the Official Journal of the munity. This has given in the flame The last part of the book is devoted to some of the more advanced features of Cobol, some of which are out always covered in New points are illustrated using but where necessary refers to an a file of information on university IBM system. He refers the reader series of questions to the Barus Parliament, by British Barus aiking, in effect, why this reasoner is only being mer by the fill Future of the printed word Action needed

tions of the New Communica-

electronic enthusiasts.

The apparent anti-climax is a

Overall, some 12 authors who

tions of the New Communications Technology. Edited by expertise covers publishing. Philip Hills, £10. France a librariansing, information science, Pinter, London.

In one sense, the accumulated been invited to contribute message of this collection of papers is an anti-climax, but it does provide a healthy corrective to the wider and headler excesses of our ence that never was and the editor electronic enthusiasts.

Computing and education have been in vited to contribute analyses, each in his own area.

It is a though a published record were being kept of a confermation and the editor electronic enthusiasts.

ence that never was and the editor takes readers to participate in the conference discussions.

Should there be enough takers

simple point, made in the opening Should there be enough takers afficies; it is no matter what kinds afficies; it is no matter what kinds and he thinks the response justifies it is no promises to publish people will init be reading. The views expressed in the book John M. Strawhorn of Automation differ in detail and presentation industries line of the US and but demonstrate a good deal of matches a comment of the strawhorn of the strawhorn of the US and but demonstrate a good deal of

matches a comment by Dr. A. K. consistency.

Kent, director of information services for the UK Chemical Society.

Drikent considers that the world sensible perspectations in the later 1980s will not ISRAI The papers are certainly well worth reading as they provide a sensible perspective.

ISRAEL BERKOVITCH

In this review of the application of viewdata/videotex technology in business, by MIKE ALDRICH, current and potential uses are discussed, cost effective applications are highlighted and future development is predicted.

How viewdata is being used in business

The word itself is rapidly becoming obsolete. A new word, deotex", is increasingly being

in order to avoid confusion, some definitions might be useful.

Firstly, what is viewdata/video-

What is its purpose? The purprive communication between people through the use of a com-puter-assisted message system for sending and receiving messages of varying degrees of complexity (the physical part of viewdata). It has an ability to apply computer processing to the messages them-selves, enabling a chain of events to be set in motion automatically by the computer through understanding the meaning of a message (the logical part of viewdata),

Viewdata/videotex is interesting because it is of universal significance - anyone can use it; it can be installed in the home and in busicess, and it is relatively loex-pensive — most organisations can afford it.

Viewdata/videotex technology consists of the ability to display textual and graphical information on a modified domestic television, in a multi-colour, stylised format, where the television is connected to a television is connected. to a telephone lioe and from there m a camputer.

The television user communicates with the television either by voice command or keyboard command. Thus, a television can be switched from News at Ten to viewdsta terminal at the press of a button. It can automatically dial loto any suitably equipment. loto any suitably equipped computer in the world and the user can access and retrieve information set in traio complex transactions or

enough for everyone.

The magic word in private viewdata systems is integration. The integration of viewdata technology with processing, octworking, data management, and other computer assisted human interface devices provides a multi-madic merely leave a message for a friend. The television can be equipped with certain additional features in devices provides a multi-media ease communication — a printer to avoid jotting down information communication system of un-paralleled power and flexibility: from the screeo; a memory on the paralleled power and flexibility;
Command an action from the
viewdata television, print the result from a terminal prioter; send a
message from a hand-print terminal and display it on n viewdata
television 10,000 miles away; type
and edita letter on a word entree. elevisioo to store and recall useful information without recourse to the computer and a directory of telephone numbers of most frequently used services. In due course, the television will also be and edit a letter on a word proces-sing system and send it to a viewdata television to the home. equipped for local computer processing in much the same way as personal computers. The poteo-This integration is already availtial use of the technology is wide sble.

ranging. At the simple level, it is The uses of viewdata in business the first new participalory communications medium since the inventional dissemination; section of the telephone.

This integration is already available.

The uses of viewdata in business and interest.

Information dissemination; section of the telephone.

Information dissemination; action or transaction systems and education or computer assisted learning systems. Dwarfing all of these usage areas is the issue of integration both at a systems level and at a business level.

Prestel it an information dissemination system integration with other types of information dissemination system that is a standation system in the feasible. However, there already exists a private viewdata system, the Redictor R1800 Series, which can be integrated with existing information dissemination dissemination systems; enabling a company with a computerized data has a to a private the data has a to a private with the sisting information dissemination be an existing information dissemination to a private of the database on the existing computer would remain unchanged The implementation of this technology is in its infancy. The lead role has been taken by British cad role has been taken by British
Telecom in its development of a
public viewdata service called
Pressle. Many other postal and
telecommunications authorities
around the world are pursuing
similar programmes.
However, Prestel is but one possible use for viewdata technology.
The great advantage of Prestel is
that by its very existence it has
created a wealth of knowledge and
expertise in a new communications

created a wealth of knowledge and expertise in a new communications technology that it now ready for commercial exploitation by UK companies on a grand scale.

A viewdata industry exists to the UK, and covers the technology of viewdata — design and implement a tioo of hardware/software

editorial layout and control, pre- grate viewdata technology into sentation, seven colour usage, existing computerised systems, the graphic arts and burnan interacooo. Through Prestel, an em-bryonic information broking business has been created exploring on to existing real time systems new frontiers in values of information and service in a new Informa-

Prestel began as a mass market lewdata information disseminavlewdata tion system aimed at the domestic residential market. It is apparent that the domestic residential market is not ready for profitable penetration yet, and Prestel is

by British com-

panies on a grand

therefore seeking to address the

business market for information dissemination systems.

also being addressed by high tech-nology, cost-effective private viewdata systema that Prestel can-

not be expected to compete with. The market is fortunately big

enough for everyone,

However, the business market is

The great advantage of Prestel Is that by its very existence it has created a wealth of knowledge and expertiee in e new communications technology that is now ready for commercial exploitation

arenas for viewdata usage - internally and externally. The internal usage can be triggered by a number of considerations: Viewdata can be used to provide wide-ranging computer-assistance to non-expert computor users (most of the people in the enterprise); it can be used as a replace-ment for older technologies (e.g. classroom teaching) and it can create new levels of shared understandings within so enterprise through its capability to commu-nicate effectively, quickly and

cheaply.

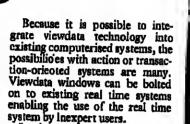
The glittering prize to improved internal communications is the potential increase in managerial span tential increase in managerial span of control. Reporting structures and ratios can be changed and managerial productivity can be radically improved. At the same time, the application of viewdata and other integrated sommunication and recording technologies in the office will improve white collar productivity.

Viewdata is considered ideal for managerial workstations, because of simplicity of use and its commuication potential both for the innication potential both for the in-dividual and for groups of people. A relevision screen can be viewed by a number of people from four to eight feet from the screen. The following is an example of lotegrated communication and recording systems: Meetings are

recording systems: Meetings are held and minutes are taken. Invariably, there are action items in the

riably, there are action items in the minimites. A manager needs to be assured that scrion items underful ken by himself and his subordinates are completed on time as agreed. Management's span of control is often retricted.

A simple application for new protessor, automatically pigeting to the action of a mixed on word protessor, automatically pigeting to the action points by person to department, distribute the minimites of a mixed on the complete storage. Allow each red plent to access the minimizer of a communication with customers are of accessity made part of the statement of the complete storage. Allow each red pent to access the minimizer of the complete storage. Allow each red pent to access the minimizer of the customer into the complete storage. Allow each red pent to access the minimizer of the customer into the complete storage. Allow each red pent to access the minimizer of the customer into the complete storage of the customer into the complete storage of the customer into the customer in the customer into th



Io the education or computerassisted learning application where the viewdata terminal is used for instruction, it is possible to integrate instruction, pacing, scoring, remedial instruction, revision and query respoose in one instruction system, at a cost per termical hour that is trivial compared to previous CAL systems.

For all these uses, the colour television terminal is significantly less expensive than a coovention computer terminal and because of its television attributes, It is considered to be less threatening, in the behavioural sense. With computer devices, reductions in cost and lowering the knowledge threshold of the user result in the

people and better control of assets. multiplication of market potential. The second arena for business In any enterprise there are two viewdata is io the world external to the enterprise. A new cummunicacommunication - tu share ing and understanding and thereby to make common esuse. Participatory communication is generally more effective than simple communication. A atructured dialogue is better than a bulletin; the sender can assess wbether the message is uoderstood.

All enterprises deal with Indi riduals outside the enterprise and with other enterprises. Communicating with customers, agents, distributors, clients and suppliers presents many problems. Whole departments currently exist to create and maintain these communications links. nications links. Armies of people travel around the country trying among other things, to create external shared understandings. Yet the most ubiquitous phrase to be found when something goes wrong is "there seems to be a communications problem." ated by communication problems

nal. At any time the aenior can see

the status of an action point and the externally generated work load

The role of viewdata within the

enterprise is thus a part of an

overall communications and

recording system dedicated to im-

through the ereation of better

shared understandings between

organisational teamwork

we live in a world where "instant's is the norm. Complex things are expected to happen quickly and in a synchronised fastion. We don't want the coffee granules without the jar and lid.

We want the instant package it is the package that pleases.

Many otherwise good products are

by majur enterprises. The fashionable plimase of the Highties may well be "customer integration plan". Viewdsto enables the contputer power to be muved outside the organisation to the real source f activity. Custumer integration plans could make traditional tradng methods and distribution

With a viewdata terminal in his home, shop ur business, the customer will be able to send messages in the enterprise, receive

hains obsolete.

The use of viewdeta technology in busi-ness in the United Kingdom is clouded by mystery of confidentiality agree-ments, Much is going on behind closed doors. There ere two reasons for the confidentiality egreements. Firstly customer integration plans have competitive trading Impact. Secondly, internal systems are at the formative stage with impact on staffing and procedures still to

messages, access and retrieve in-formation. Many customers will not bother to keep their own separate records of their deslings with the enterprise. How many people keep their own bank ac-count ledger today? The customer

will become integrated into the enterprise through this new commutations medium.

The enterprise will in turn find it easy to enterprise will in turn find it easy to entered its range of services and products. Its distribution network will become increasingly logical rather than physical. The transportation of the transportation of the transportation of the transportation of the result will change our three communications viewdata-style and this result will change our lives, our work and our content.

Description of the first and phase can be seen in many organisation in many organisation in the state of the lift that many communications are being made with many communications are being passe with many communications are being passe with many communications are being done. It is pass the experimental conference in grants what the internal conference in a place with many communications and the internal conference in a passe of the internal conference in a place was an other transportation. In the conference in a place was an other transportation in the internal conference in a place was an other transportation.

Last trap of virginities are passing when the conference in a place was an other transportation.

The euthor, Michael 1 drich (left) is manife director and chief street officer of Redifon Conters Ltd., the second large British-owned computer and from university 1962 with an honour is gree in history and a second large. gree in history and epent hie entire case in the computer industry in its the eulinor of over the lished erticles on company computing he last lectured widely in the last Western end Easing Europe, the Middle ship East. Aldrich is a proelonal member of inBritish Computer Social
and a member of the British
Institute of Menagement

in business in the UK is that hy mystery of confidential agreemeots. Much is going at hiod closed doors. There are reasona for the confidence agreements. Firstly, cutous itegration plans have compaintrading impact. Secondly, issue systems are at the formation as with inverse or refficient as the formation as with impact on atalfing and pro

The scope of activity is fan ahle. Customer integraie through viewdata by pass in ing husiness communication terfaces with existomen - w branches, mail, telephone, in gration can take place elther at umestic or businett led Viewdata shopping will important outlets during the 1961 viewdata supermarket mede dising a wide range of good liverable in a collection commut

The Information Service Box uniness, also identified recent the US as Viewdata Value Att Networks, has already need Brokers are selling informal and services. There is a tree

dnus potential for neighbouse computer centres providing a kerage business and offenses cution services. The use of the diver for data storage will open - the ultimate homered machine where the student wirwdata television for land

and reference from home.
The ottachment of video can recorders to viewdata telements with integrated electronic privides a unique mixture of the text, outloo and video communication. tion. Mixed media community will appear during 1981. is in video disc will offer ereo mon? markable opportunities.

For the next two year, is thrust of business viewdat as will be in internal/extent a formation dissemination internal and the committee of the tion processing and company as a sisted instruction applicates. Thereafter there are vide possibles in entertainment and passibles in entertainment and passibles.

Developments with week Developments with the ferminals are continued on the chips—a new generation of the left of the continued of the continued of the continued of the continued of the left of the better periphers medice feedons terminal services with a salarans function viewests again, the mester are substantial.

The pace of arresponding direction is being discussed institutional services are substantial services

a safer place

the colliery

scratching coal out of the ground. I have not seen any estimales n when the same process started in Britain but it is certain that coalwinning developed into an organised industry in this country during the 16th century.

IT WAS probably 3,000 years ago when the ancient Chinese started

This ancient industry has made enormous strides in recent years and computers have begun to contribute greatly to growing reliability in mining operations. Where, in fact, can computers be employed usefully in our pits and what do they achieve?

In the 34-yesr period since nationalisation, the mines have been mechanised increasingly with great beoefit to both human safety and productivity.

The single over-riding impediment facing the industry at the moment" in the words of NCB Director of Mining Research, Peter Tregelles, is that of machine

It is in this ares that computers are being applied to order to realise the full potential of the mecha-

Adaptation

The computerised monitoring and control system conceived to cslied MINOS (Mine Operating System) and employs a standard DEC PDP 11/34 with universal software developed at the National Coal Board's Mining Research and Development Establishment (MRDE).

Software and system designs allow colleries to create ao operstional system on site adapted to their own needs and to modify i further as colliery plans unfold.

At Bagworth Colllery in Leices-

shire, MINOS starts up nearly nice miles of underground coal conveyors and three storage bunkers io the correct sequence, monitoring them contiouously and stopping them as needed. It also monitors the pumping

perations essential for keeping he mines from flooding.
A sub-system called FIDO Face Information Digested Onwhether the machine is running or

Introducing the systems here is

s prevented from cutting coal.

MINOS makes

all the more noteworthy since Bag-worth is one of the country's oldest pits - started over 150 years ago its productivity steadily.

Bagworth has appeared in the Guinness Book of Records for an overall productivity of five tons a manshift (now exceeded) and total production of over one million

Monitoring

In more general terms, the researchers were able to report last month three major MINOS appli cations, firmly established and available on a commercial basis.

 Monitoring and controlling conveyor belts and coal bunkers for coal transport underground at 27 collieries, with five further vstems ordered.

 Monitoring ventilation for management at five collieries. Coal face monitoring through FIDO at 14 collieries with 13 further systems ordered. When these are completed a total of 110 cosl faces will be covered by the

Associated with this programme s obviously another dealing with inatrumentation. Besides all that is manded of instruments in any job for use with computers, not-ably reliability, these have to be "pitworthy" — standing up to severe conditions of use and

electrically safe for use in mines. They include an ultrasonic belt vance over beit-weighers. For deep bunkers, radar has been applied to motutor the level of coal where depth exceeds 50 metres.

To determine the percentage of stone in the coal on a belt, oucleonic techniques are being exa-

Misalignment

An ingenious idea for giving an bsolute indication of the position of the pit-cage, iodependent of the existing Indicator, has involved using magnetic atripes on winder

detecting slip or slack rope.

19TH CENTURY RISK OUT OF THE 20TH CENTURY BRITISH MINING INDUSTRY

Dr ISRAEL BERKOVITCH EXPLAINS HOW COMPUTER TECHNIQUES ARE HELPING TO TAKE

Further monitors measure conveyor belt speed, detect tears any slip between the drive and the belt — an important source of heating that can lead to fire.

The principle is that a proximity sensor counts the holes in the roller driving the ben and another counts those io a roller driven by the belt. The difference measures

So far, the MRDE claims that introducing MINOS has means that fewer men are needed on the transport systems, delays are re-ported accurately and the equipment helps greatly in diagnosing

maintained properly, they now give "95 per ceot clearance availability to the face".

Where FIDO has been applied, has given a stimulus to keeping machines in use; machine delays have been reduced and over hal

last less than three minutes. The veolutation systems are at an earlier stage of application, but have shown a marked superiority in comprehensive safety surveil lance over previous systems of mo-

Inconceivable

clude improving transducers and introducing programs to optimise bunker use and to segregate store

handling.

FIDO is being improved by providing editing facilities, eliminating overlap problems or spurious delays and including data on machine position which managers

have requested strongly.

NCB chairman Sir Derek Bzra
has commented that the new technology is providing the means to
measure in ways that are intriosically more reliable and to calculate variables that would have been inconceivable without present

processing power. Nevertheless, MRDE has begun further work to equip MINOS Mark 2 with distributed processing and iotelligent outstations giv-

agement information system, sed on computer disc storage with versatile presentation and intest and assessment

metres in a sixth colliery; integrat-About six collieries have compuing control systems into multi-col-liery complexes could raise this ters installed at their coal proparation plants, where coal is graded into different sizes and figure to 30km. Transmisalon systems will consist of local links at 600 bits/sec, colliery links for monitoring and control at 4800 bits/sec and interwashed" by specific gravity into different grades corresponding to different amounts of ask-forming

lo turn, this calls for work on

the transmission systems which

may extend up to about 10 kilo-

Interrogation

Using secondary computers for management information has been under study for several years; these were used to collect and store

both for interrogation when

pary data for long periods

ncombustible matter, in the coal. computer links at 64 kblt/sec. The aim is to optimise plant Apart from meeting the need for intrinsic safety of equipment used in mines, MRDE uses standard

availability. Associated with this project is development of new mo-nirors for determining ash, sul-phur, coal moisture and its cal-orific value. elecommunication techniques and protocols and is beginning work on optical fibre transmission. Discussions about technical im-

ovements underground tend to lead to the key question of when it will be possible to automate coal-winning completely and withdraw men from potential danger areas.

On this, expert opinion is undetermidably cautious but work is in progress on a microprocessor system mounted in a coal shearer.

It will steer the power-loader monitor and control the advance of

MINOS in action ogain — this time at the Bagworth nonveyor beit transfar point.

Aspiration

What happens on the coal-face is so complex dynamically, however, that successful full automation is thought to be an aspiration for the

Meaowblle in many other though more limited ways, the computer is helping to make our coal mines safer and more produc-

REFERENCES

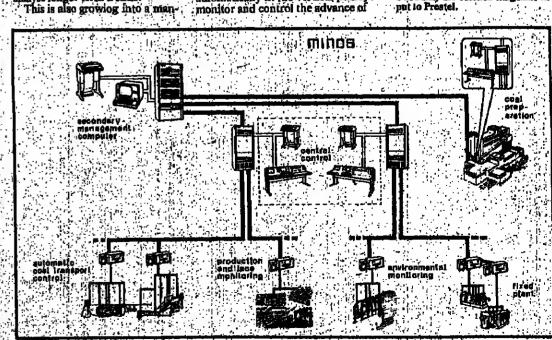
General background on coal: "Coal on the swifebback" by Israel Berko-vlich (George Atten and Unwin, 1977); "Coal, energy and chemical storehouse" by Israel Berkoviich (Portcuttle Press, 1978). Mining research: Mining Research and Development Establishmeon, An-nual Report, Mining Research and

Development Establishment, An-must Report. Mining Research and Development Establishment. Pro-jects. Both annuits obtainable from MRDE, Ashby Rd, Bretby, Burton-on-Trent, Staffs DE15 OQD. Or Berkovitch is a consultant in chemical technology and editor of

chemical technology and editor SCITBL, the science magazine put to Prestel.



MINOS helps to ensure a smooth flow in the Bagwarth Colliery (Leicastershire) pump house.







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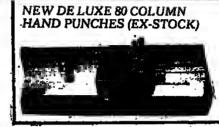
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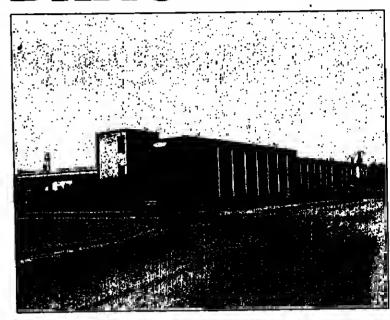
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PRODUCT NEWS INTERNATIONAL

Versatile contact series

A RANGE of Holute solderless breadboards, designed to permit repeated insertion of discrete and C components, is available from Semiconductor Specialists.
Called the 8136-HB1 series, the

breadboards are available in four standard sizes, incorporating 20, 40, 60 or 80 patterns. They will accept dust-in-line packages from eight to 40 pins, and provide 40 contact positions for the insertion of discrete components having lead dismeters of 0.2 to 0.3 inches.

The contacts can accept hundreds of component cycles or wire insertions without marked deterioration of contact reliability. The boards are made of Va-inch glass epoxy, with tin/lend plated tracks and gold over nickel-plated

Prices start at £30 in quantities of between one and four.

Semiconductor Specialists (CW), Carroll House, 159 High Street, Yiewsley, West Drayton, Middlesex. Tel. (08954) 45522.



Adability is the hallmark of Racognition Equipment's plug-compatible OCR wand.

Plug-compatible OCR wand

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wand for attachment to the existing IBM 3277/3278 terminals and

The characters may be printed on a variety of printing mochines, from typewriters to computer-driven printers. OCR reading is claimed to be five times faster than conventional key punching and eli-

minates most errors. OCR wands plug into the termi-

keyboard and screen, after which either the keyboard or the wand reader may be used to input data directly ioto the system. Options are available to read OCR-A or OCR-B and each unit may be customised to meet user requirements for data cheeking and validation.

Recognitioo Equipment Ltd (CW), 442 Bath Road, Cippenham, Slough, Berkahire SL1

A PLUG-COMPATIBLE OCR nal via a connection between the It can do this efficiently by using sutomstic adaptive routeing which redirects trallic nutomatically around congested or failed lines The 6050 employs an end-to-end ARQ system for complete error

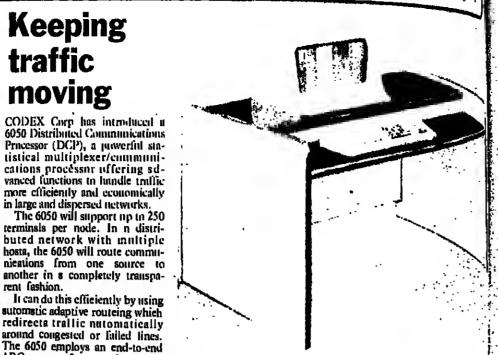
Another feature of the 6050 is user selectable destination routeing which enables a termioal operator to select the host

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All-purpose VDU desk makes debut

DESIGN PLUS, the Edinburght-based manufacturer of Five Plus based manufacturer of Five Phis the screen may be adjusted office furniture systems, has developed a VDU desk which the tween those levels; the second of th firm claims is suitable for all

Until now, most manufacturers have offered different desk burn ture for the various hardware systems available or have adapted xisting units for use

The Five Plus VDF desk is based on Hexibility and loss bern designed on two levels, one for the screen and the other for the keybontd. Design Plus sava it is passilde to have the keylasard at typist level and the secont at standard desk height.

The assemble is sufficiently llexible to offer one-height level

moves between 5 degrees plat

The Pive Plus desk a at production in a standard sale working surface, and Fre Pas tings available toclude sim gromanite, left- or right-hand tage tellites plus the overbeds meters wide with a total desir Al cin . 30 cm for the typist and bu em for the screet.

Murkelert Consultati Murketter House, 399 Gr hawk Road, Chievick, Land W6. Tel: 01-741 4387494.

loss of incuming date the

rent loop, permitting the 12-bit interface with most 20 ml past

temp devices such as idented perible terminals and pripars

It gives the HP-35 der 18
GMI printer notition. Unit not
ing a peripheral printer helicit

1(1)-85's ionegrated thems may the a serial or period.

The general purpose if a little purpose if a purpose purpose purpose and working purpose in a pu

interfacing, which is minimized a simple wide data path interfer

Computer Systems (in Howlett Packard List.

important.

Three interfaces boost the HP-85 range

THREE new interfaces for Hew-lett Packard's HP-85 make this personal computer a flexible, powerful and law-cost controller for a wide variety of measurement applications, the company claims.

The interfaces are the Serial (RS-232-C-compatible), costing THREI new interfaces for Hew-lett Packard's HI'-85 make this

(RS-232-C-compatible), costing £222 and General Purpose £0 parallel and Binary Goded Deci-mal, priced at £298. They supplement the HP-18 interface card introduced last year and retailing at

give the HP-85 a complete set of general interfaces applicable to all HP desk-top computers.

Personal computer users may low communicate with a variety of peripherals and instruments using the HP-BS interfaces, including low-cost serial printers and many types of measurement devices.

The serial insertace card peovides the HP \$5 with bit-serial

asynchronous data communication capability supporting both RS-232-C operations and current loop Work.

Serial interface earth features inking Street Land,
Wakingkam, Serial
Kingham (8734) 734774

Computing for education is alive and well in Australia

ing terminal operating require-ments of university computing.

Since the formation of Facom

(Austr) Ptv Ltd, several universi-

ties and government departments

have installed a range of main-

M140 to the M190F located at

Canberra. The installations 1

visited were considered highly successful in terms of cost, reliabil-

ity and operation, particularly since IBM software could be run

The only criticism I encoun

tered concerned the console and Its

ween the average Australian and

Ispanese operator's height was apparently overlooked by Facomi

The power of the installation does not so much reflect the size of

the student population at the uni-

versity concerned as the way in

which the equipment is run. Some

universities carry out a consider-

able amount of commercial or gov-

rnment computing work.
The University of Monash in

because it incorporates a large bureau service for the Victoria

Hesith Computing Service which provides payroli, inpatient report-ing, ambulance reporting and

other services to hospitals

It has recently established

Swift growth

operator's chair. The contrast be-

the opportunity of visiting a manufacturer's latest release if this number of university and eduestional institutions in the south and esstern areas of Australia, primarily to see how computers were be-

ele sre personal but I hope it provides a reasonable representation of the educational computing scene for the 1980s io Australia.

There has been no "Flowers Report" or anything like it for Australian academic institutions only a loog legacy of autonomous state developments in public af-fairs, not least in educational matters, including university comput-

This is not to say that forms of university co-operation and mutusl help io computing matters donot exist. They do - but this makes little difference to the almost unique nature of each university and educational institution

One effect of this "development in isolation" is that Inter-univer-sity networking is virtually non-existent. An exception to this general impression is the current cooperation and inter-networking that exiats between certain departments within the Universities of New South Wales and Sydney.

This is an unofficial arrangement, however, in the sense that it is not explicitly accredited by the universities, neither is the right of secess to the network by students and staff controlled by any

Lack of interest

Melbourne, for example, has a very large installation principally Inter-state networking as a reliable service through the Com-monwealth Scientific and Industrial Research Organization Network, CSIRONET, is indeed well-developed, but only a few universities are able to make use of this for their general computing requirements on a cost-charging

In part, this lack of university network development could be attributed to the wide geographical separation of the major cities of number of staff in the computing centre is correspondingly large, row coastal belt extending over several thousand miles. However, this does not account for the lack of interest in networking between neighbouring computing centres, such as, for example, the four large universities located in the Mel-

The inauguration of Austrace, and carry out the university the Australian Telecoms Public Payers and administrative compayers and administrative compayers and administrative compayers and administrative compayers. Network, in puting, including software de-is situation. velopment. But where no commer-

Packet Switching Network, in 1982 may change this situation.

Several universities retain their cisi or administrative work is own engineering staff and at the University of Queensland, for cample, six full-time engineers be lower than that found in the carry put all maintenance tasks on a complex of two major and several minor Digital Equipment (DEC) External networking may not be installations, and carry a stock of spares larger than is retained by campus networking has been swift the manufacturers in Australia.

power of the larger machines, and particularly file storage and dataase access, can be made available

Mooash University is carrying ties operate US equipment. In the mid-'70s several Burrougha out a similar exercise and is also machines were purchased to join the well-established ranks of DEC developing s microcomputercontrolled bus ayatem operating at machines (the PDP-11 series still 1.5 megabits per second. Use of the bus to link equipment on forms the numerically Isrgeat group of university computers io Australia) together with Univec campus is determined by a contention protocol which caters for The last few years have seen the lines, pages and records up to an replacement of earlier equipment by VAX-11/780 machines which nals are connected to the bus in groups through microprocessor-based multiplexers. are proving popular for the grow-

Only at Sydney University did 1 and any work being carried out on Ethernet or Cambridge ring systems. The computer science department there is developing a ring-type system for campus-wide digital iostrument inter-connection and the computer centre is currently laying fibre-optic cables

does not permit cards to be used students at all. The move away from the punch eard was initiated principally by

lonash University some years ago when it developed the Moneca system of which about 50 units are still distributed about the country. Interactive and terminal usage iominates in user service developmeat, much uf it via dial-up facilities to the central mainframe. The argument over the use of a number of individual and self-con-

tained microcomputer systems for

snudent use or service via terminal

connections to the central main-

frame is currently being fought

department, that of the University of Tasmania, is carrying out all its undergraduate teaching using a set Apple IIs, with which is available s

shared hard-copy device incorporating a large spooling disc system.

econdary schools for the purposes of basic teaching and computer

sity spent some time towards the end of last

year visiting Australian universities and edu-

cational Institutions. The main purpose of

his visit was to take a look at how compu-

tars wera being used as an aid to learning.

Ha found a complex situation, very different

from that In the UK. Here he reports his

findings and gives a personal view of educa-

tional computing in Australia.

The most advanced deelopment in this area is to be ound in Hobart, fasmania, where VAX-11/780 is linked to five PDP-11 machines (some located outside Hobart) to provide a. 193terminal system over 4.8K-byte/ second private lines to about 50 schools throughout Tasmania. This is Tasnet, the state-wide schools system now an integra part of the State educational system. It uses a modified Decoet system to give virtually error-free message transfer.

It is used for database inquiry purposes (e.g. teacher availability and speciality), management (e.g.; tlme-tabling and travel fund allocation) as well as for teaching pur-

Currently Hobset is commissioning a set of Apple 11 colour systems for use in primary educa-

PDP-11 computers, operating un-der Unix, and a few other machines with interfaces pro grainmed to simulate the PDP-11 The network software contains only four network commands, un like the much more complex CSI-RONET, and is designed simply to allow users to ing-in to a remote computer. The users are essentially research staff, post-graduate studeots and others who have con tributed to the development and maintenance of the locally modfied version of Unix software,

Unlike most proprietary operating systems, Unix is not supported the software vendor. In Austra Unix has fostered a close allance smong the computer science departments of universities and rtiary education colleges which elps to support this sort of de-

Locally developed software was very much in evidence at university computing centres. There is nowhere near as much software package sharing as is common among UK universities. Most compilers are supported, Pascal becoming the major language for those departments engaged in microprocessor work.

The use of microcomputers and microprocessors for teaching and research was very much in cyl-dence in all the universities l visited. The choice of microprocessor appears to be controlled more by availability and back-up service than on technical grounds.

Computer research in Australian universities sheds an interesting light on the shift of culture lo-wards the US and shift to trade with Japan and, in both cases, oway from Europe. This is evident in many areas of public life in Australia. In the educational field, apart from the origins of equipment used, it may also be seen in the co-operation with, and travel to, American universities for research and staff secondment pur-

One interesting international field of research is the work being carried out by the Volveraity of Sydney, several American universities and Sendai University in Japan using an ex-NASA ATS-I communications satellite presently geostationary above the Pacific Ocean. This provides facilities for voice and digital communications

munications protocols and microprocessor digital filtering has been carried out at Sydney, but for conducting international con-

made in many directions. I was left

medical information direct access system using a dedicated Bur-roughs B6800 computer to provide An aerial view of Camberra and the Australian National University.

between departments in preparation for a multi-drop

Bthernet-type system.
The University of Queensland has also installed fibre-optic cables between departments and expects to use these with appropriate moderns to link its current range of A university computing centre may have a large staff complement for another resson. Most centres are not confined to academic work. terminals and RJEs to the central DEC KL10, mainly in order to save on the very high cost of cables and modema majorained by

national protocols is low at Austranational protocols is low at Australian universities, except for the Australian National University in Camberra which has a number of software projects going in X25 and in packet-switching technology. This may reflect the considerable the manufacturers in Australia.

Those universities dependent on as regards RJE and terminal manufacturer support can, almost awitching arrangements without exception, quote examples of serious problems in mainten about 50 temote devices are lost of the support, particularly those where It has become necessary for engineers to be flown in from abroad.

Access to some

The modified software used Post Office).
Interest in X25 and other inter-

The modified software used with this system allows a function keyped to be operated so that simple functions can be carried out on log-in without the student being required to learn a job-control and editod language.

Further, the keyboard can serve a dual role permitting a complete set of Pascal functions (and some Fortran functions) to be entered by means of single key strokes.

For the 200 second-year and 100 third-year atudents a set of 50 fully interactive remainals is linked to the DEC PDP-10 system and 100 printers located in each laboratory.

The use of Apple or Sorverer

The use of Apple or Sorveter microcomputers is also found in Anstrallan schools computing. The local educational authorities in Tasmania, South Australia and Western Australia are currently. installing large numbers of

ment at the University of Queens-land has carried this type of detion and already has over 50 in use land has carried this type of development a stage further in its use of modified Tandy TRS80 and Sorcerer (Zilog Z80-based) micros to provide the initial computing requirements for their 600 first-year students. Three laboratories, each equipped with 15 microcomputers, are linked through an Intel 8085 node to a local printer and also to the mainframe DEC PDP-10 system. software is designed to assist the lower age groups in fundamental arithmetic, reading and spelling skills, although a number of com-puter-aided learning texts are also becoming available for the older tudents from the Hobart Centre.

Cost-recovery

Charging departments for their common and this apparent need to voice communication. This operate under a partial, or in some concerns the mechanisms needed cases foral, cost-recovery basis is considered to be a major reason. why many academic departments choose to purchase their own com-puting equipment and to operate fairly independently of the computing centre.

Some departments possess oute considerable computer resource. At the Universities of New South Wales and Sydney a form of networking co-operation exists be ing for education very much alive ments and the CSIRO Division of

at frequencies around 140MHz. Currently useful work on com use of computer resources is fairly is the three-nation research in

ferences a subject perhaps slightly depressing for those of us who appreciate travel.
It includes an investigation into

language translation facilities, chaired panel discussions, automatic block retransmission, and, given sufficient bandwidth, facsimile transmission. In conclusioo, I found comput

Computing Research located with the final impression that alwithin the precincts of Sydney though the various autonomous University. This is linked to States and educational institutions construction in turn, is do not talk to each other as much linked to overseas computer networks Tymnet and Telenet.

This Sydney-New South Wates

THURSDAY 12 MARCH

WEDNESDAY 11 MARCH

echnologies C.C. Basz, Vice President, Ungermenn Bass, USA

A Wolfworth, Royal Military College to Science, UK persiophenia Systems Chishman, Oavid Dack, Hewlett-Packerd, UK A low coal self-contained support system for the Initial 2820 / Wardle, A Kerim & P. J. Charmby, Liughborough University Technology, UK & P. J. Charmby, Liughborough University The MACK midro development facility R β Vaughe, SPI. Initianational Research Centric, UK The cestion at universal microprocessor development by X R Green, Blassdale Computer Systems, UK Software

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R.4982

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D.8012

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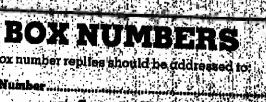
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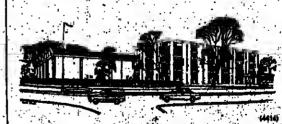
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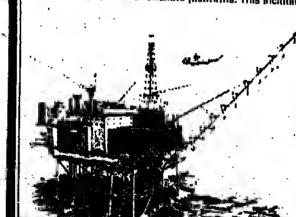
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(4) Programmer/Analyst with a aolid Cobol background with exposure to Transaction Processing and Database Systems.

It is important that applicanta are adaptable, articulate, neat in presentation and possess a high degree of technical competence. This is a highly reputable organisation implementing top level management for many

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Automation Systems, part of Kent Process Ltd., are a young dynamic company spacialis-ing in computer based Process Control end Telemetry systems. Beed in Hitchin, Hartfordshira, with cuatomers throughout the world, they are continuing to develop their sophisticated renge of systems and consequently require additional key personnal with expertise in any of the following areas:

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Software Systems.

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This is an excellent opportu nity to tesm up with a highly successful company who are still young anough to recognise and appreciate dedication and determination. Career opportunities are excallent offering variety end scope on projects in the UK end ocsionally oversaas.

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Systems Programmers and Technical **Authors UK and Overseas**

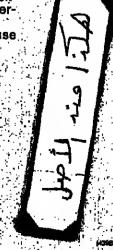
Hare is en axcallent opportunity for technically minded individuels with an interest in alther eystems progremming: or technical writing. A leeding computer manufacturer is now recruiting additional parof s rapidly expanding section of the Industry PROGRAMMERS with a minimum of two years' technical experience will be involved in a variety of projects ranging from software design and development through to finely testing and implementation prior to general release.

TECHNICAL AUTHORS WIL some previoue experience in apecifications and software menuels will be required to work in close essocietion with both software deelgn and product test teams. Applicants should be prapared to tackle end solve all menner of prob-lems end maintain e high sten-derd of documentation et every stage. Repid career advancement, la envieaged for those with the right background, quelities and enca.

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Senior Data Processing Project Officers

Brussels The Commission of the European Communities wishes to recruit 4 senior stall to promote the European Data Processing Industry and the use of Data Processing.

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Posts A and B (Major application, network and software development projects) require

- experience of project planning, cost control and contract negotiation of large-scale projects;
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- In addition all candidates muet:
- Have an excellent knowledge of one Community Language and a satisfactory knowledge of another;
- be nationals of a member country;

 ideally be aged between 32 and 45 but older candidates whose other qualifications are especially strong will be welcomed. The salary and conditions of employment are in line with the importance of the posts to the Commission and will be communicated to shortlisted condidates.

Please send a detailed curriculum vitae and apecify in which post

Recruitment Division Commission of the European Communities 200 rue de la Loi, B-1049 Brussels Pleasc quote reference M M/1 The closing date for receipt of completed applications is: 13th March 1981.

The Commission of the European Communities

£6,500-£10,000

Programmers/
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Three years Cobol experience. Some of these positions also require

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for new networking/comms project. Parient experience cought by our chem: military, no delimitations, access controls, networking, not sage awitching, etc. Project teams will be leased on site in Rucks.

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Team Leeders and Analyst Programmers should idenly here PDP 11, RSX 11M and Fartran or RTL2 to Join the Humpshire ellents Knowledge of mapping

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gramming background, re-quired for new project being undertaken by Systems House in Central Landon, 2 or more years' experience in large 1(:1, 290tts under VM198 required.

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Contact: Margaret Stevens

Software Designer

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The Company's expansion means that they now have a vacancy for a Software Designer with the production of the company's expansion means that they now have a vacancy for a Software Designer.

with proven analytical skills and who has a specific interest in applying computer control to help make machines more usable and effective.

Applicants should have experience in real-time control using mini or micro computers and should enjoy working in an independent fashion. Added advantages would be a working knowledge of an ASSEMBLER language and of multi-processor systems. The Company expects to commute as rate of progress and there will always be opportunities for the future career of the successful applicant. Contact: David Hendry

Banking Analyst

City

c. £10.500+benefits

The London branch of this prestigious European bank is about to embark on a major programme of new applications development and is seeking an experienced Systems Analyst to play a key role in this project.

Experience must consist of at least 18 months Systems Analysis in a Banking environ-

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Long term career prospects are excellent and a good salary is supplemented by attractive fringe benefits.

Contact: David Hendry fringe benefits.

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Berkshire

£12k – £15k Our Client, well known throughout the world, is developing communications software for a large network and requires an SNA Software Specialist to join the team. Applicants must have a sound IBM software background and be full familiar with SNA internals. Ability to lead a team would be an advantage. Excellent salary, benefits and Contact: Jim Baker

Analyst/Programmer neg. to £10,000 Hertfordshire

Our client, a well established marketing company who specialize in sound recording equipment, are currently expanding their D.P. department. They are developing a sophisticated real-time sales and distribution system as well as order processing and general

ticated real-time sales and distribution system as well as once, placed to batch, all of which use data base techniques.

They require an Analyst/Programmer to assist the Computer Manager in the development and maintenance of their ICL 2904 site.

The successful applicant will be required to have a working knowledge of COBOL and be able to work under his/her own initiative.

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Contact: David Hendry

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c. £10.000 + car + bonus

£8,250

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Responsible for particular customer installations, you will provide full pre and post safes.

support, client listson and on-site implementation.

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BASIC An excellent bonus scheme plus attractive range of fringe benefits. Contact: Brian Postles

Analyst/Programmer

South London

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Candi lates should have a sound knowled of RPOII with some exposure to the Samuel and the sound in the sound in the sound and the sound in the sound in the sound in the sound and sound in the sound in t

James Baker associates. International Personnel Consultants, 32 Savile Row. London W1. Tel: 01-439 9311.

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Computer Shift Control Officer

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Application forms may be obtained, until February 28, from:

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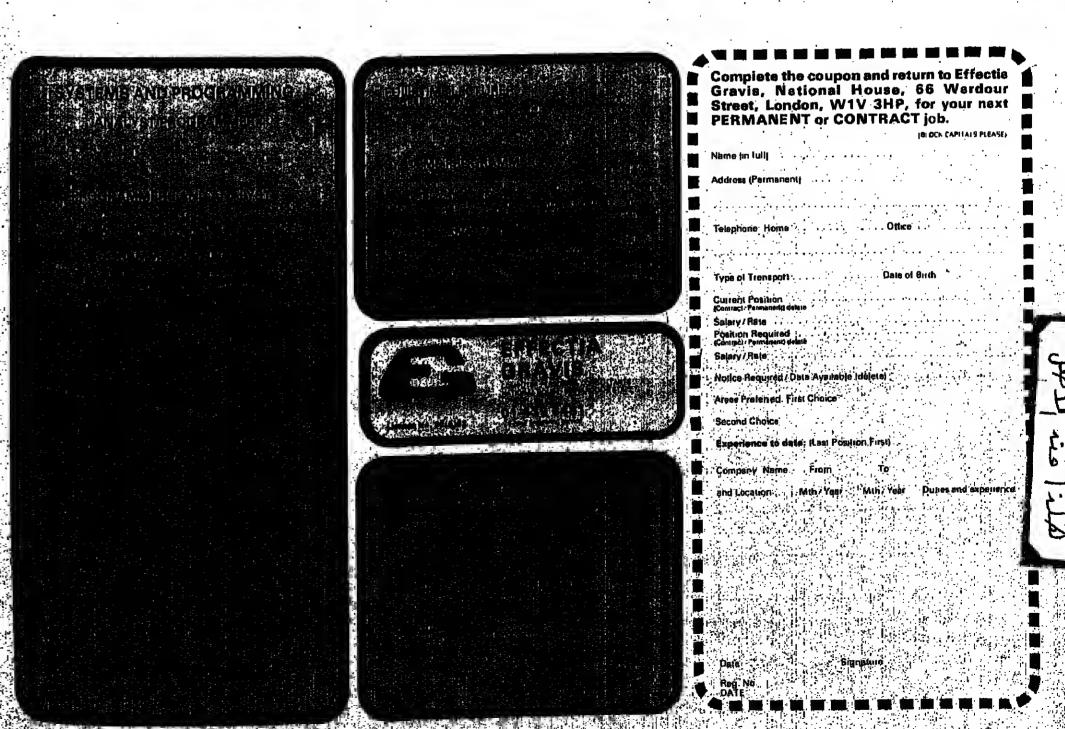
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elesman might fust make a Another aspect of the buyspecial delivery to my home (evarice); and it matches the ing process is its epparent two-level etructuro that apwallpaper (impulse)." plies equelly whatover the product might be. It is as ap-plicable to forklift trucks as it The reeson why su many sales people are able to snatch defeat from the lows of victory is to buying a pair of stockings. I call it The Techs because they relax when they reach the point of price

nical/Emotionel Split. performance superiority. It is a common occurrence They fail to eppreciate that for a salesmen to achieve the the selling process becomes position of fovourite much more critical between contender on the ehort-list the short-list and final decionly to lose the business to an sion stoges, primarily because the situation not only veers from the technical to the emotional, but often from More ofton than not, this is because he has not appreciated the switch from technithe logical to the illogical. cel to emotional decision critoria which often occurs in the Good. Do you have size six in inel steges of negotietion.

micromesh nylon at less than £1 e pair? Splendid! Now let me seo, this florel design is himself which products are able to do the job at e price his rather nice, or perhaps this flush-pink. No. I fancy e company can efford. This produces the classic short-list chenge. How about - " which usually coosists of sev-A pair of stockings todey, a eral contenders. Having forklift truck tomorrow. The reached titls point, the technietages of the decision moking cel evaluation is virtually over and the buyer has greater scope for exposing his own emotional needs. process are much the same.

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CONFERENCES

DP in local government

A SEMINAR to be held at the Bloomsbury Centre Hotel, London from March 2-6 will discuss the future role of computers in local government. Issues of interest to local authorities and o Speakers will examine the Issues

terest to local euthorities and o general view of the current state of computer technology will be sumber of demonstration suites of programs. Organised by Ventek, the event will also include the display of its effectionle office which has been adapted for use in local government. Details from Ventek, Station House, Harrow Road, Wembley, Middx. Tel: 01-903 9626.

Speakers will examine the Issues surrounding software protection covering how the law relates to extent of software copyright, the size and extent of software observed to covering how the law relates to covering how the law to covering how the law to cover he covering how the law to cover he

SEVERAL authorities in the microcomputer industry bave been brought together for the Computer Software Protection conference to be held at London's Waldorf Hotel on March 3. Speakers will include Mike Gurr, of Mike Gurr Associates, Peter Laurie, editor of Practical Computing, John Butcher MP, Julian All association of Applied Computer Techniques and Alistoric Kelman, practicing barrister and computer programmer. The lergeomputer Industry bave

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AN EVENT devoted to the use and application of computers in engineering will be held in London from March 24-26. Organised by the Computational Mechanics Contre, the International Conference and Exhibition on Engineering Software will feature software and bandware suppliers including Tektronix, Compeda, Versitee and Dynamic Software services. The opening address will be given by Dr Nicholas Perrone, director of the AN EVENT devoted to the use

cholas Perrone, director of the

thir Kelman, practising barrister and computer programmer. The structural methanics program for the US Newy. Topics to be covered will include graphics, techniques, applications for microcomputer systems and computer added design. For further information conjuct Dr. A. Addey placement of the Printes is to identify the Constant itself, from the fundamental formula (hi + ny2 for an n x n grid, This gives 65 in this case; which must obviously be the sum of the top row less that sum of the Royal Bath Hotel, Bournemouth between April 29 and May 1. Speaking for industry and Education at the Scottish Office, and Johis White, députy managing director of Frichs Telecom. Additional features include Alex Fletcher, Mirister for industry and Education and demonstration of equipment, Details are available from Mrs. Speedale on 01:551 1643.

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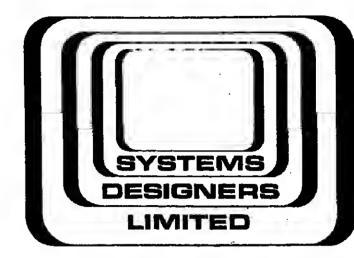
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